

# Butterfly

## PHOTOGRAPHER'S HANDBOOK

A Comprehensive  
Reference for Nature  
Photographers

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William B. Folsom





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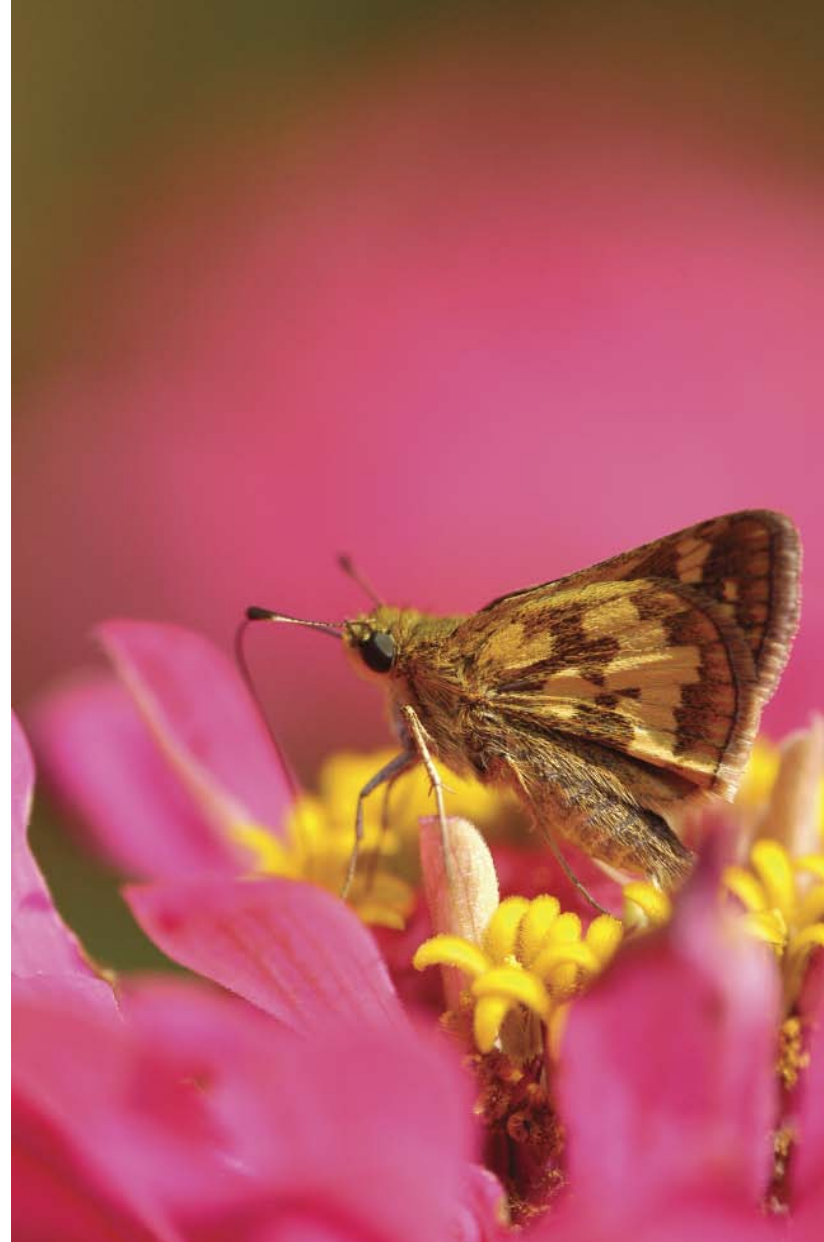
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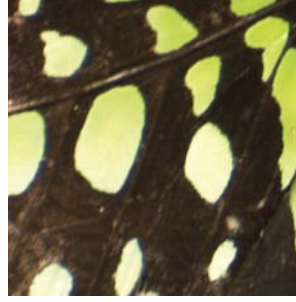


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The members of the Washington Area Butterfly Club (WABC) also have served as great sources of accurate information about butterflies. I continue to respect their knowledge and their willingness to share that information with me.

Finally, I also need to acknowledge Craig Alesse's help in publishing this book. Craig Alesse is the publisher of Amherst Media—and books on butterfly photography don't begin to rival other subjects. So, the fact that this book was published at all is due to Craig's personal support.





## Preface

The turn of the new millennium brought an exciting dimension to the art of photography: the digital camera. Less than a decade later, film-based photography has been largely replaced by a tidal wave of newer, better, less expensive digital cameras. This amazing

development has brought affordable photography to millions of consumers around the world, and the trend shows few signs of letting up.

At approximately the same time, new developments in optics allowed binoculars to begin focusing closer than ever before. With this technology, outdoor adventurers can easily get up-close views of butterflies, as well as distant birds. (*Note:* Butterfly photography complements bird photography in many ways. Both subjects are comparatively small, fast moving, and cautious about people entering their “zone.” As a result, both have benefited from the new technology.) With today’s sophisticated equipment, it is possible to observe and photograph butterflies with minimal effort and expense. By allowing naturalists to more closely observe and document birds or butterflies, digital cameras and telephoto lenses have effectively narrowed the gap between the camera and the subject.

This book, like its predecessor, *The Art and Science of Butterfly Photography*, is divided into two sections. The first section deals with the butterfly itself (types, behaviors, habitats, etc.), and the second part provides information on how to photograph these creatures. The main difference between this book and the previous book is that digital photography is so much easier than film photography. Many readers will be able to start taking great photographs after reading just a few chapters in this book.

I am pleased to dedicate this book to Keith P. Tomlinson, administrator of Meadowlark Botanical Gardens, in Vienna, VA. He took the unprecedented



The Blue Morpho (*Morpho peleides*) is brown on the outside and hard to see when it's sitting still. It has brilliant blue on the insides of its wings, which shimmer and sparkle when it flies.



A Green or Tailed Jay (*Graphium agamemnon*) is a tropical species that is found in the Philippines.

step of planting native plants, bushes, and trees in a botanical garden. Most administrators of public gardens would have chosen the safe approach and planted beautiful, exotic flowering plants from all over the world—never such “mundane” plants as Joe Pye weed, milkweed (who ever would have thought about planting weeds!), or the hundreds of other plants commonly found throughout the Potomac River watershed. This collection of native plants has allowed Meadowlark Botanical Gardens to flourish as a safe haven for a large, and growing, number of butterflies, birds, reptiles, and animals.

## Technical Notes

I use Nikon cameras almost exclusively and all of the images in this book were taken with Nikon D100 and D200 digital cameras (except for the photograph of the Lilac-Bordered Copper that I photographed in 1984 with a Nikon FM2 film camera; that was the first butterfly I ever photographed). I bought new Nikon D300 and D700 cameras after I began writing this book and did not have a chance to use them fully before its completion. While making the final edits, however, I was able to include a few images taken with those newer cameras. Nikon products simply produce outstanding results and I am constantly amazed at what they allow me to do. I certainly believe that Nikon shares as much credit for my butterfly photographs as I do.

There are a few other brand names of equipment or suppliers that I have cited in this book because I have found these products to be helpful to me. No endorsement of any manufacturer, company, association, product, service, facility, or web site is implied or given. Omission of any of the above neither implies nor connotes anything negative about their product or service.

This book was written primarily for photographers living in North America, because that is where I live and photograph. In recent years, however, I've managed to visit several island countries in the Caribbean, as well as Panama and Costa Rica in Central America, and have included some of those images in this book.

As you read this book, please take what I have to say as “suggestions” and not as rules. Don't consider my advice as the final word in butterfly photography. In fact, I encourage you to sit down at your computer and Google “butterfly photography” as well as “photographing butterflies.” You'll be amazed at the results. There are many fabulous photographers out there who are sharing their own tips and techniques. It just goes to show that there are many ways to be creative and effective.

As you read through this book, you'll notice I have tried to keep things as simple as possible. Photographing anything—especially for a newcomer—is difficult. Photographing butterflies can seem impossible. So, I've tried to make it easier for newcomers to begin to understand what photography is all about without getting too technical. I hope this approach proves valuable.

Photography should be fun. Butterfly photography will allow you to see, capture, and enjoy the incredible beauty of the natural world around you. And if time permits, perhaps you can help ensure that there is something left behind for your grandchildren to photograph.



A Barred Yellow (*Eurema daira*) rests upside down.

Butterfly photography will allow you  
to enjoy the incredible beauty  
of the natural world around you.



PART ONE

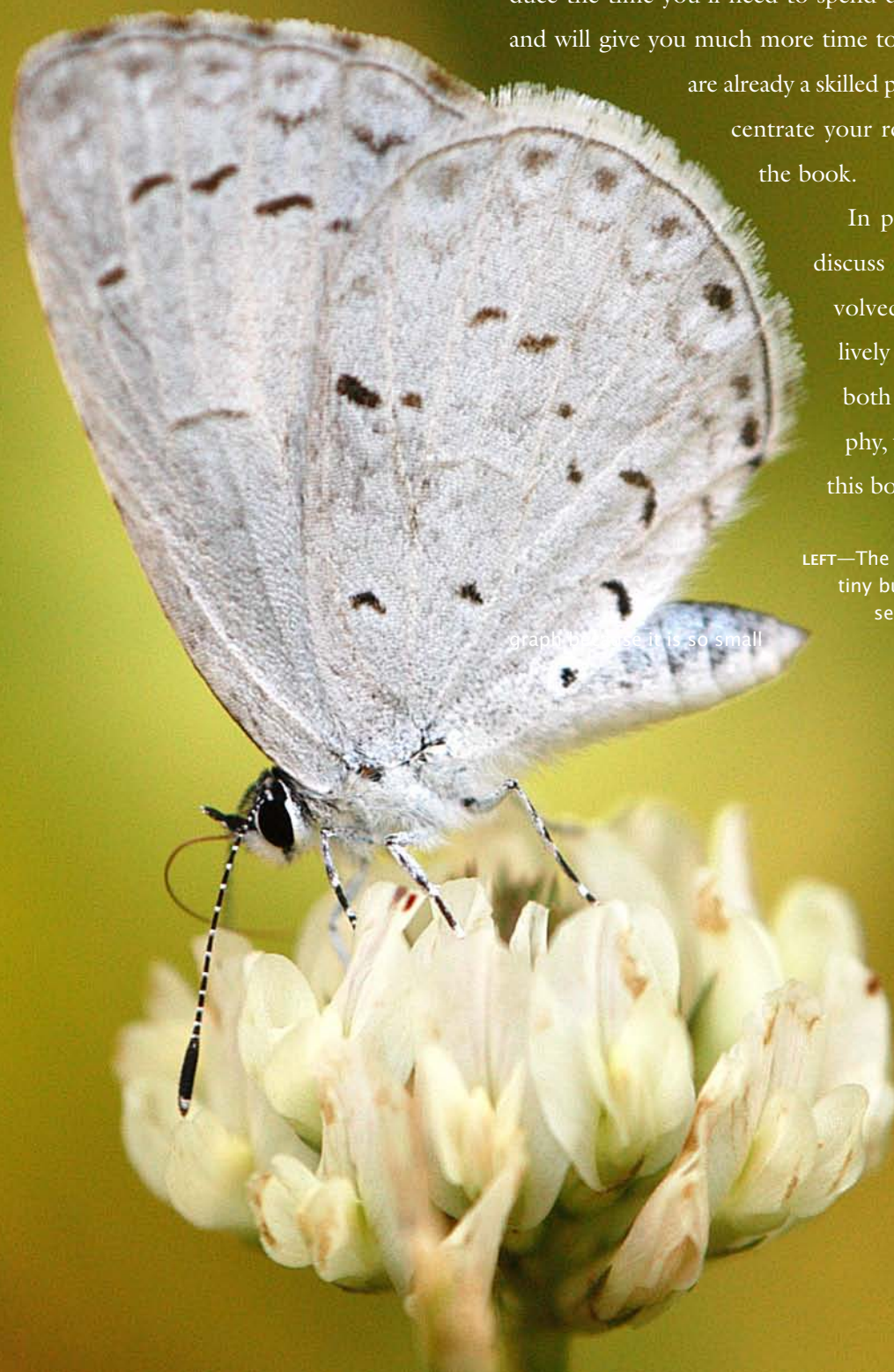
# BUTTERFLIES

The key to success in just about any endeavor is to study your subject as best you can. I've learned a lot about butterflies and their behavior over the past twenty-five years or so, and in this part of the book I will share that information with you. It will reduce the time you'll need to spend discovering things yourself and will give you much more time to take photographs. If you are already a skilled photographer, you can concentrate your reading on this portion of the book.

In part two of this book, I'll discuss the technical aspects involved in photographing these lively creatures. If you're new to both butterflies and photography, you'll find both sections of this book equally helpful.

LEFT—The Azure (*Celastrina ladon*) is a tiny butterfly that is usually easy to see but pretty difficult to photo-

graph because it is so small







# 1. The Butterfly

Butterflies are insects of the order Lepidoptera. Until recently, the earliest date for the evolution of butterflies was thought to be 65 million years ago, during the Cretaceous period (also known as the “Age of Flowering Plants”). This conclusion was based on scientific

analysis of five pieces of amber from the Dominican Republic that contained a Metalmark butterfly. In 2007, however, the discovery of a 100-million-year-old butterfly fossil in China’s Gansu province revealed that butterflies were present far earlier than previously thought. One theory is that moths that stayed active after the sun arose managed to escape predation by bats and these day-flying moths eventually evolved into butterflies.

## Butterfly Traditions

Egyptians used butterflies in their hieroglyphics. The ancient Greeks thought that butterflies represented the souls (called the *psyche*) of departed men. Butterflies were used as decorations during the Ming dynasty (1368–1644). European legends speak of witches that could disguise themselves as a *butterflie* or *butterfleoge* to steal butter before flying off. The word “butterfly” is now thought to originate with the Brimstone butterfly named “butter-colored fly.”

## Moths vs. Butterflies

Butterflies and moths both are members of the order *Lepidoptera*, taken from the Greek words *lepis* (scaled) and *pteron* (wing). Indeed, both moths and butterfly wings are covered with tiny, pigmented scales. If you find a dead moth or butterfly, you can rub the wings between your fingers and see the shiny residue that comes off the wing—just don’t try it on a living moth or butterfly; losing those scales will hinder its ability to fly.



This reproduction of a Ming dynasty silk textile depicts a swallowtail butterfly.

According to The Lepidopterists' Society, there are approximately 20,000 species of butterflies and about 130,000 species of moths throughout the world. Of these, about 775 species of butterflies exist in North America (including Canada, the United States, and northern Mexico).

## The differences between butterflies and moths can sometimes be difficult to spot . . .

The differences between butterflies and moths can sometimes be difficult to spot, but the following might help newcomers to the field:

- Moths tend to fly at night. However, there are many moths that also fly and feed during the day. Butterflies are active mostly during daylight hours.
- Moths tend to fold their wings in tentlike fashion against their bodies or flat against the surface while most butterflies sit with their wings up over their bodies. Many butterflies hold their wings open flat. Skippers may even display a curious “jet fighter” pose with forewings closed up and hindwings held flat.
- Moths tend to be small and squat, while butterflies are large, colorful, and slender. (Of course, try explaining that to a large Luna moth or a small, squat skipper [from the butterfly family]!)
- Moths tend to be dull, while butterflies tend to be colorful. The reason is simple: if you fly around at night, color makes no difference—but you still want to stay hidden during the day so predators won't find you. Bright colors help you locate other butterflies of the same species. Some butterflies, however, are drab and use their wings as camouflage to blend into their surroundings. Most skippers are also pretty drab, favoring dark browns and tans.
- Moths tend to have arrow-shaped poses; butterflies do not.

A Polyphemus Moth (*Antheraea polyphemus*) is a large moth and has some interesting patterns on its wings. Like most moths, it rests with its wings out flat (not upright) and it has no knobs at the ends of its antennae.



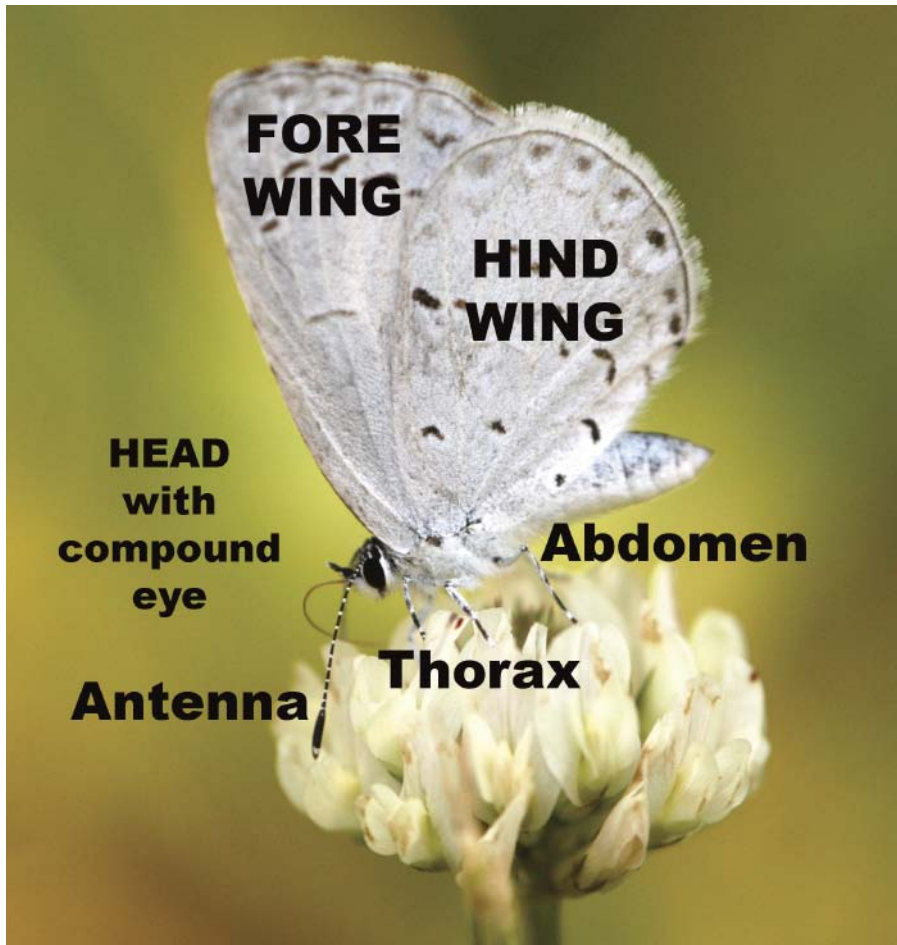
Perhaps the best visual clue is the antenna:

- Moths have a frilly or thread-like antennae to help them detect the faint scent of pheromones at night. This allows them to locate potential mates. Some moths' antennae have a feather-like appearance.
- True butterflies have a knob at the top of their antennae, while skippers have little hooks or points at the ends of their antennae.
- Butterflies depend more on visual clues (e.g., bright or ultraviolet colors) and don't need the sensitive antennae that moths have. So, if it has knobs on its antennae and is fluttering around during the day, chances are fairly good that it is a butterfly.

### Butterfly Anatomy

Butterflies are unique insects, and an understanding of their various parts is helpful in identifying them. This colorful insect's body consists of a head, a thorax, and an abdomen.

**The Head.** The head is generally round and has two large, multifaceted eyes. Two antennae with knobs sprout from the head and help the butterfly



A Summer Azure (*Celastrina ladon*) helps illustrate the various parts of the butterfly.





A Great Tree Nymph (*Idea leuconoe*) from the Philippines.

find food. A unique feature is the long proboscis that the butterfly curls up when flying and then uncurls when sucking up liquids—much like someone drinking from a straw. If you look very closely you might see what appear to be tiny whiskers growing around the antennae; these are called labial palps.

Butterflies have multi-faceted eyes that allow them to see the movement of predators from all directions. Some of the facets are also directed downward (much like bifocal glasses) and aimed at helping the butterfly feed. This is important because if you, as a photographer, can approach the butterfly from below, you will be less likely to be identified as a predator than if you approached from above, like a bird.

**The Thorax and Wings.** The thorax (mid-body) is divided into three parts called the prothorax, mesothorax, and metathorax. Each segment has a pair of legs (six in all, like most insects). The two front legs face forward and are used to help the butterfly climb around flower petals or leaves. The back four legs help stabilize the insect.

Butterflies have two sets of wings. The forewings (one on each side) are attached to the mesothorax while the metathorax supports the two hindwings. As you grow more sophisticated in finding butterflies, you will discover that the inner/outer or upper/lower sides of the forewing and hindwing are distinctly



patterned and both hold clues as to the exact species being photographed. Butterfly wings patterns and colors can be divided as follows:

1. False eyespots and markings designed to fool predators into striking unimportant areas of the butterfly (typically the back part of the wing), allowing the butterfly to escape battered and torn but alive.
2. Bright colors that warn predators that the butterfly is distasteful or poisonous.
3. Colors and patterns (including markings in the ultraviolet range) that help the butterfly find prospective mates.
4. Wings that are patterned to look like soil, bark, or leaves, making them very hard to find.
5. Markings that mimic the wings of butterflies that are poisonous or distasteful to predators.
6. Dark colors that help soak up the sun on cold mornings.

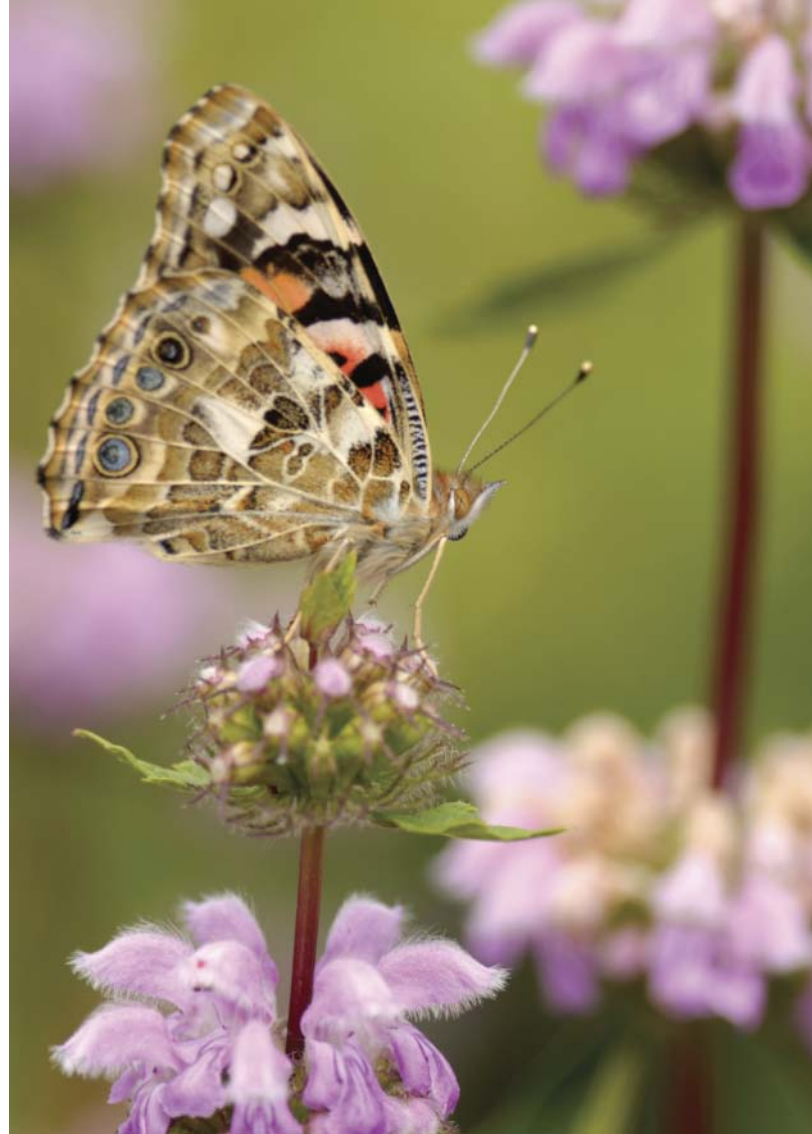
A series of “veins” run through these wings. After emerging from their chrysalis (moths emerge from cocoons) the butterfly rests for a few moments, pumping fluid (hemolymph) into these vessels, forcing the wings to unfurl. If these fluids fail to open the wings, the butterfly will not be able to fly. After a few moments, if all goes well, the fluids harden and the butterfly flies away.

**The Abdomen.** The abdomen is the portion of the butterfly’s body devoted to processing food, eliminating waste, and storing fat. This is also where the reproductive organs are found.

Like other flying insects, such as wasps, bees, and flies, butterflies are attracted to rotting fruit, scat, carrion, and the same unpleasant items that attract hoards of flies. And, like flies, they will die if you spray your flowers or lawn with poisons in an effort to rid your garden of wasps, bees, flies, mosquitoes, or other insects. This is also true for the caterpillars voraciously eating your favorite flowering plants: those are the future butterflies that will grace your garden. Be sparing of bug sprays and weed killers; both kill butterflies.



A Zebra Longwing (*Heliconius charithonius*) is frequently found in Florida.



LEFT—The topside (inside) of this Painted Lady (*Vanessa cardui*) is mostly a bright orange with black tips and white and black dots. RIGHT—The outer (or bottom) sides of this same butterfly's wings appear almost totally different, with a mixture of tans, browns, whites, and pinks with gray circles.

### Butterfly Identification

There are approximately 775 different species of butterflies in North America. So, while you will have plenty of subjects to photograph, no matter where you live you'll need help to properly identify those you photograph. Several excellent butterfly identification books are available for the public. Some of these books are listed in the appendix. These books can be invaluable in helping you to identify the species you see in front of you. The best books will show you both sides of a butterfly's wings (top and bottom) because there can be significant differences between each side. Sometimes the butterfly has dazzling colors on the topside, but bland on the outside so when it folds its wings it blends into the background. The two photographs of the Painted Lady (*Vanessa cardui*) that appear above demonstrate the differences that can occur on either side of a butterfly's wings.

Part of the fun about photographing wildlife is getting to know your subjects. The appendix section includes a lot of information on where and how to go about learning more about butterflies.



## 2. Butterfly Families

There are two groups of butterflies: “true butterflies” (*Papilionoidea*) and “skippers” (*Hesperioidae*). The true butterflies are usually large and slender with beautifully colored wings. Skippers are smaller, duller, fatter, and are easily confused for moths. Butterflies

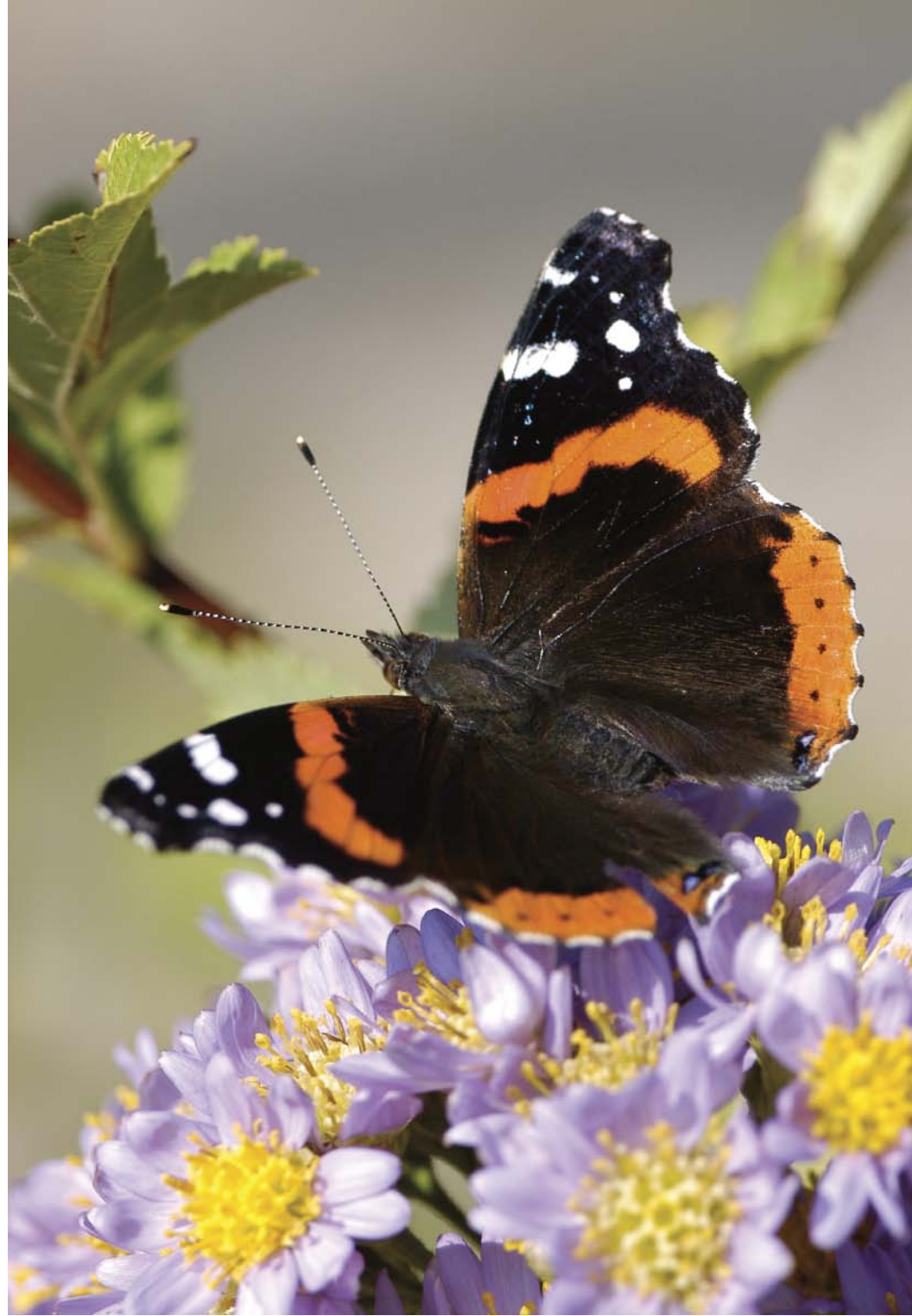
can range from tiny, less than a dime in size, to giant. The Queen Alexandra Birdwing (*Ornithoptera alexandrae*), which makes its home in New Guinea, has a 12.5-inch wingspan—twice the size of most of the larger North American butterflies.



A Sachem Skipper (*Atalopedes campestris*). Skippers tend to be short, stocky, and somewhat plain in color.



Butterflies tend to be larger and more slender insects with a variety of bright colors. Shown: a Red Admiral (*Vanessa atalanta*).



### **True Butterflies**

**Swallowtails and Parnassians (*Papilionidae*).** Swallowtails are among the most spectacular of the butterflies. The “tail” at the bottom of their wings helps identify the large, colorful butterflies. These “tails” are there to confuse birds into striking the back of the wing, thus allowing the butterfly to fly away a little tattered but alive. There are some thirty species of Swallowtails in the United States and about six hundred around the world. Parnassians appear similar to most Swallowtails, except they don’t have the characteristic “tails.” In-



stead, they have very rounded wings. They are usually white with red-and-black spot patterns. There are only five Parnassians found in North America.

**Whites, Yellows, and Sulphurs (*Pieridae*).** Whites are usually white in color, so their name helps people identify them quickly. One of the most common whites is the Cabbage White, which was imported from Europe in the 1800s and is now commonplace throughout much of the United States. These are among the first to arrive each year and among the last to disappear. Black dots on their wings help people identify this prolific butterfly. Some whites have patterns on their wings that are visible only in the ultraviolet world and these patterns help the butterflies find each other for mating.

Yellows and Sulphurs usually have yellow to orange wings, and many can be seen flitting about grasslands and meadows from early spring until late fall.



A Cloudless Sulphur (*Phoebis sennae*) enjoying the warmth of a sunny day.

Gray Hairstreaks (*Strymon melinus*) are always a welcome addition to any garden.



All members visit flowers, but they especially like members of the legume family. These butterflies range from small to medium-size. There are about sixty species of whites, yellows, and sulphurs in the United States.

**Gossamer-Wings (*Lycaenidae*).** These butterflies are usually pretty small, but they make up for their diminutive size by their brilliant, iridescent blues, reds, and oranges. The group includes Blues, Coppers, Elfins, Hairstreaks, and Harvesters. They are nectar feeders and have a preference for flowering plants with clusters of small blooms.

**Metalmarks (*Riodinadae*).** Metalmarks are nectar feeders found in warm, tropical areas. They range in size from small to medium. They are usually rust-

colored. There are only two species of Metalmarks found in the Eastern part of the United States (out of thirty metalmarks found throughout North America). Most of the metalmarks are found in Central and South America.

**Brush-Foots (*Nymphalidae*).** Brush-foots are named for their small, hairy front legs. They are medium to large in size and are nectar feeders—although some feed on sap, rotting fruits, scat, damp earth, and the carcasses of dead birds and animals. These brightly colored insects usually come in brown, orange, yellow, and black. The Fritillary butterfly is identified by the silvery spots on its wings. The Mourning Cloak is one of the few butterflies that over-winters as adults. Viceroy's mimic the Monarch, which birds avoid because of its bad taste (a result of eating milkweed).

**Tropical Longwings (*Heliconidae*).** The Longwings are a tropical butterfly and many are brilliantly colored. The Zebra Longwing is commonly found in Florida. While most butterflies tend to live solitary lives, Zebras are one of the few social varieties, congregating in groups in the evening. The Longwings are usually black with yellow or red stripes.

**Milkweeds (*Danaiidae*).** Milkweed butterflies derive their name because they only use milkweeds as their host plant. The larvae feed on milkweed, digesting substances that make them taste very unpleasant to birds or other predators. The Milkweeds include the Monarch, Queen, and Viceroy butterflies. The Monarch is known for its epic journey of thousands of miles from its win-

The Viceroy (*Limenitis archippus*) looks very similar to members of the Milkweed family, which includes the Monarch. Its close coloration helps it avoid being eaten by birds who find the Monarch distasteful and thus avoid it (to the benefit of the Viceroy).







LEFT—This Peck's Skipper (*Polites peckius*) was placed against an interesting background. RIGHT—The Long-Tailed Skipper (*Urbanus proteus*) is usually found in coastal areas from Mexico up through the mid-Atlantic region. It has a very long tail.



ter grounds in Mexico and California northward to distant feedings and mating grounds and back again each year.

**Satyrs and Wood Nymphs (*Satyridae*).** These woodland butterflies are usually a drab brown that helps them blend in with their surroundings. The adults feed on sap, animal droppings, and a sweet byproduct produced by aphids. The caterpillars of this species feed on grasses and sedges.

**Snouts (*Libytheidae*).** The Snout butterfly, named for its long labial palp that looks like a snout, prefers muddy soil next to rivers and streams. The American Snout is the only Snout found in North America. Snout caterpillars live on hackberry trees, where the caterpillars feed on leaves.

### Skippers

There are approximately two hundred species of skippers in the United States. Skippers are usually short, squat, and fairly dull with small, triangular wings and hooked or thread-like antennae. They are usually difficult to identify; lots of practice is needed to become proficient in identifying these butterflies. There are two families of skippers: Spread-Winged and Grass (*Hesperiidae*), the latter of which includes the Giant Skippers. You can find skippers just about anywhere and they are usually plentiful, so you can practice on them until you get proficient.





### 3. Where to Photograph Butterflies

I took my first butterfly photography class from the famed lepidopterist Dr. Robert Michael Pyle at a National Wildlife Federation Conservation Summit in Snowbird, UT, in 1984. Up to that point, I knew very little about butterflies. I rarely

saw them. Never looked for them. I was mostly interested in photographing birds.

Dr. Pyle took us out into an Alpine Meadow where I saw spectacular scenery and lots of wild flowers. I simply did not see the butterflies darting from one flower to another until Dr. Pyle began pointing them out to the class. Suddenly a whole new world of photographic opportunities jumped out at me. I've been photographing butterflies ever since.

A lot of my students ask me where to look for butterflies. The answer is simple: almost anywhere. A fellow photographer and I once walked past a bush covered with butterflies while we were on our way to an appointment. Later, as we were waiting in the lobby, I mentioned the bush to my friend. "I never saw them," he replied. Sometimes you just have to become aware to see what's out in the open. Once you've learned to "see" butterflies you'll be able to find them just about anywhere: from beach to mountain, north to south, and east to west.

#### Best Places to Photograph Butterflies

**Your Garden.** Your own garden is probably the single best place to start photographing. Why? You can keep watch over your garden throughout the summer months, noting when the butterflies arrive, which flowers they feed upon, whether they are laying eggs, and when the sun is best for photographing butterflies on a specific flower or plant.



The Lilac-Bordered Copper (*Lycaena nivalis*) was the first butterfly I ever photographed. The butterfly was sitting on an Indian paintbrush in an Alpine Meadow at Snowbird, UT. (Taken with a Nikon FM2 film camera).



A Wild Indigo Duskywing (*Erynnis bapisi-ae*) at the Meadowlark Botanical Garden helped illustrate the importance of using native host plants as a means of expanding the population of butterflies. This butterfly was once very scarce, but it adopted to a new host plant (crown vetch), enabling the butterfly to expand its range.

As you become more familiar with the butterflies that visit your garden, you can begin photographing them over and over again until you become proficient. Keep your camera handy in your kitchen so you're ready to go—and keep a notebook nearby to record your efforts. Don't try and rush things. Spend a summer or two to become proficient. If you work at it, you should become a fairly good butterfly photographer in a season or two.

Beginners sometimes grow discouraged because they see the same butterflies over and over again and rarely find those beautiful butterflies they see on television. However, what might be “ordinary and commonplace” in one location will be exotic and fun to photograph somewhere else. Also, many of the most stunning butterflies live in pretty remote jungles in distant parts of the world. The only way you'll see them is in a butterfly aviary or by taking a trip. A better solution is simply to become the best photographer of butterflies of your region.

**Botanical Gardens and Parks.** Gardens and local parks are another place to visit in search of butterflies. Many public gardens and parks understand the value of preserving and promoting environmental awareness and are likely to offer some guidance on where and when to find butterflies. A great many botanical gardens also use signs to identify the plants located in their garden (with both a common English name and a Latin name). So, when you find a

### ***Your Own Butterfly Garden***

Conservationists are urging homeowners to provide a home for butterflies in their gardens. As more and more natural habitats are lost, it becomes increasingly important to offer butterflies alternative sites to feed, mate, lay their eggs, and rest.

A garden that already has a variety of nectar plants is a great beginning. Careful planting should allow nectar plants to grow throughout the season with new plants blooming as others die back. Plantings should include flowers, herbs, grasses, and a fruit-bearing bush or tree, which are also popular with birds. (*Note:* The butterfly bush [*Buddleia*] is an imported, non-native flowering bush that is a favorite with many butterflies. It is popular among gardeners because it can provide nonstop action throughout the summer. Ultimately, however, it is the *native* host-plant species—the ones butterflies lay their eggs on and caterpillars eat while growing—that are key to butterfly survival.) Your butterfly garden should receive lots of sun but be protected against prevailing winds. Butterflies appreciate a damp spot where they can sip water without getting their feet wet. A pile of logs, shrubs, or brush gives them a place to hide when it rains.

Over time, you'll learn which butterflies visit your garden and be able to plant specific hosts to attract them. Hopefully, a resident population of butterflies will find your garden an attractive place to live. (And remember: No pesticides and no herbicides!)

flowering bush attracting lots of butterflies close to where you live, you'll be able to write the name down and take it to your local garden center in hopes of attracting the same butterflies when you plant it at home.

**Butterfly Gardens.** There is a growing trend among park managers to include specific areas devoted to attracting butterflies. You can usually ask for the location of any butterfly garden at the entrance to a park, and sites where you can find butterflies are frequently shown on the maps you receive when you purchase your entry tickets. Those are the areas I usually head for when I visit a new garden. In some places, the entire facility is devoted only to butterflies and there are extensive plantings throughout the area designed to attract butterflies.

Many schools are also becoming involved in creating butterfly gardens as a way of teaching children the importance of ecology with the added benefit of beautifying their grounds.

**Roadway and Other Small Gardens.** You'll find small gardens next to roadside rest stops or picnic areas, or at some restaurants during your trip. Some gas stations (mostly in rural areas) also have flowers planted around the station. Many hotels and motels also have small gardens that will give you a chance to look for a new butterfly after a day of meetings or being on the road. Finding butterflies can be easy!

**Butterfly Houses, Vivariums, or Aviaries.** I've photographed butterflies for about twenty-five years, and during that time there has been a surge in the

There is a growing trend to include specific areas devoted to attracting butterflies.

### ***Increasing Butterfly Diversity***

Meadowlark Botanical Gardens in Vienna, VA, is the site of an amazingly successful program to increase butterfly diversity through plantings of native hosts (grasses, flowers, bushes, shrubs, and trees). The program was initiated in the late 1990s as part of administrator Keith P. Tomlinson's desire to include plants from the Potomac River watershed in the garden area. Together with an experimental meadow that was left to grow wild, a small lake was turned into a natural wetland, and an ambitious tree-planting program was undertaken.

The result has been a tremendous expansion in the garden's butterfly population. The horticulturalists working on the garden knew they were on the right track when a female Wild Indigo Duskywing butterfly appeared out of nowhere and began laying eggs on the Wild Indigo plants they were trying to plant—while the plants were still on a tray in their black plastic containers! The garden now has a strong, viable Duskywing population.

Meadowlark now has an aggressive program to expand its butterfly habitat and their population has increased from about twenty species in 1969 to about fifty-five species today. This makes the butterfly restoration program at Meadowlark Botanical Gardens one of the most successful in the world.





A Royal Blue (*Myscelia cyaniris*) from a butterfly farm was on display at Brookside Gardens in Wheaton, MD. If you can't afford to travel the world to exotic locations, butterfly houses offer you ideal conditions for photography.

number of butterfly houses. Some are fairly small and intimate, others are truly spectacular in size and complexity with many different habitats on display. These houses, or aviaries, allow the butterflies to fly freely in an open or closed facility.

Some naturalists object to taking photographs of butterflies in captive conditions and argue that photographs of butterflies should only depict those in their natural environment. While I agree that it would be ideal to photograph only butterflies in their natural world, most families simply can't afford to fly off to the rainforests of Brazil or the cloud forests of New Guinea to see a butterfly. Thus, butterfly houses give the public the opportunity to see and photograph beautiful butterflies from around the world for a modest entry fee.

In addition, most butterfly houses take good care of their butterflies, which are free to fly around in enclosed buildings, safe from birds, spiders, wasps, and other natural predators. They enjoy a climate-controlled environment, safe from winds and storms, feed on nectar or fruit, and have plenty of water to keep them fit. Most of the butterflies you find in a butterfly house are much less ragged than those found in nature and you can easily find many, many species



that might take you days or weeks to find under natural conditions. Finally, they are not allowed outside of their enclosures, thus they have no impact on native butterfly species. In short, I'm an advocate of learning about butterflies and butterfly photography in butterfly houses.

**Butterfly Farms.** Dr. Robert Michael Pyle, America's leading lepidopterist, and many other prominent individuals and organizations, are totally opposed to butterfly farms that raise butterflies for release at weddings and social occasions hundreds or thousands of miles away. ( *Note:* Jeffrey Glassberg, president of the North American Butterfly Association]; Paul Opler, author of *Peterson Field Guide to Eastern Butterflies*; Robert Robbins, curator of Lepidoptera at the Smithsonian Institution; James Tuttle, president of the Lepidopterists' Society; The American Museum of Natural History; Calloway Gardens; the National Wildlife Federation, and others totally oppose releasing commercially raised butterflies into the environment. To understand their concern, go to: [www.naba.org/weddings.html](http://www.naba.org/weddings.html).)

Dr. Pyle is concerned about the spread of diseases from farmed butterflies to wild populations. He is also concerned about genetic mixing, where butterflies from one region interact with those from another region. (You can un-

A Green or Tailed Jay (*Graphium agamemnon*) from the Philippines.



derstand how confusing it would be for a Monarch programmed to fly to its winter grounds in California to breed with one genetically engineered to fly to Mexico for the winter.) This also applies to “butterfly kits” sold commercially for children to raise. All of these experts strongly oppose releasing these commercially-raised butterflies into the environment.

In fairness, however, there are associations of butterfly breeders that export tropical (and domestic) butterflies for shipment *only* to butterfly houses throughout the world. In some places, these efforts have served to create an awareness of the importance of butterflies, their host plants, and the environment among indigenous peoples who now have an economic incentive to save these natural resources.

One of the most responsible organizations I have seen is the Costa Rica Entomological Supply Company in Alajuela, Costa Rica. The firm represents many butterfly farmers in Costa Rica and operates as a clearinghouse for farmers shipping butterfly larvae to the United States. Joris Brinckerhoff, the general manager, has helped establish butterfly farming in remote areas of the country and his activities are producing dramatic results—especially when compared to other South American countries where forests are being rapidly depleted for use as minimally productive farmlands.

In addition, there are those breeders who raise and release native butterflies simply for the joy of working with butterflies. Meadowlark Botanical Gardens

A Doris Longwing (*Heliconius doris*) butterfly enjoys tropical flowers at the Costa Rica Entomological Supply Company in Alajuela, Costa Rica. Butterfly farmers in Costa Rica now protect local species of butterflies and grow host plants to support their growing export business to butterfly houses around the world.





is fortunate to have such an individual, Mona Miller, who raises and releases hundreds and hundreds of Monarchs, Swallowtails, Painted Ladies, and others during the course of a year. She obtains her eggs and caterpillars from her own garden and raises them where predators can't reach them. She uses these butterflies to teach children about butterfly ecology and helps them see the beauty and necessity of protecting butterflies and their habitat.

**In the Wild.** You can find butterflies just about anywhere in the world—from seashore to mountains, forests to deserts, and alpine meadows to city



This Leopard Lacewing (*Cethosia cyane*) comes from Southeast Asia.





A Clouded Sulphur (*Colias philodice*) seen resting at Meadowlark Botanical Gardens. These butterflies are usually hard to approach and fly off quickly when spooked.

parks. That makes butterfly photography an exciting new pursuit to include in just about any trip you and your family take. All you need is a guidebook, a close-focusing set of binoculars, and a camera.

Wild butterflies are much harder to photograph than their cousins who frequent butterfly gardens and flowers in public parks. They are much more erratic and much less tolerant of an approach. If there is one thing I can say after more than two decades of trying to photograph butterflies, is that they are predictably unpredictable.

There are several approaches you can take to finding butterflies in the wild. The first is the easiest: hit or miss. You are driving down the interstate and you see a sign that says “picnic area ahead.” You pull off, unload the wife, kids, and dog, then sit down for a soda. You notice a small cluster of flowers across the parking lot with some butterflies on it. You walk over and take a few shots. It’s simple, easy, and it works—in fact, you will probably capture images of butterflies you’ve never seen before in your life. I did this during a photo trip in the mountains of Colorado a few years ago. At each and every stop, I’d spend a few minutes looking for butterflies and I found them with minimal effort. Photographing them, however, was not always as easy!

If you prefer to plan your trip, the Worldwide Web can be a great help in locating butterflies in certain regions. There are many sources of information for



people in the United States. One of the best is [www.butterfliesandmoths.com](http://www.butterfliesandmoths.com), which includes a map search that helps you locate native butterflies within the counties of the various states. If you are equipped with a good guidebook, you should be able to significantly narrow your search to a manageable area. A list of other interesting web sites is found in the appendix section.

Joining a butterfly club or on-line discussion group is a good decision. You will quickly learn where to find butterflies in your neighborhood or state. Butterfly club members frequently go out as a group to look for butterflies during the summer months and they are usually tremendous sources of information. I have enjoyed being a member of the Washington Area Butterfly Club for many years and am always amazed at the breadth of knowledge of the



The fabulous Blue Morpho (*Morpho peleides*) visits tropical gardens from Mexico to Colombia and Venezuela. Their brilliant blue upper wings sparkle as they fly, but give way to a circle pattern ("eyespot") against chocolate-colored wings when they land to feed. This butterfly was photographed feeding in the garden of one of the hotels in San Antonio, Costa Rica.





The Rusty-Tipped Page (*Siproeta epaphus*) is mostly found south of the United States but has been spotted in Texas.

members—and also how much they enjoy sharing their passion for butterflies with newcomers. On-line discussion groups are excellent sources of information for local butterfly news, alerts, interesting finds, and other useful tidbits.

The North American Butterfly Association might also get you involved with other butterfly groups across the United States. If you were going on a trip to Arizona, for example, you might be able to link up with a club member close to where you will be traveling in hopes of learning a few favorite spots to find local butterflies. Local butterfly enthusiasts can also help you identify some of their native butterflies.

When traveling abroad, it is sometimes difficult to wander around looking for butterflies, especially if you are on a tour bus going from one historic church to another. Many hotels and restaurants have gardens, so I take the time to visit the gardens while others are getting ready for the day or after I've finished my meal. If you take the time to look, you will be surprised at what you can find in even a small garden.

#### **Specific Hints on Where to Look**

**Outdoors.** When driving or hiking you can frequently identify areas where butterflies are likely to be found. The best places to look include:





FACING PAGE—A White Peacock (*Anartia jatrophae*) displays its delicate beauty at Brookside Gardens in Wheaton, MD.

RIGHT—The Silver-Spotted Skipper (*Epargyreus clarus*) is common to Virginia.



**buffer zones**—In these areas, one habitat is next to another. For example, the area where a meadow borders a woodland offers shelter and food sources for both forest-dwelling and open-air species.

**openings**—In woodland settings, where there is an opening, sunshine reaches the ground and flowers have a chance to grow.

**islands**—Look for a shady grove in a meadow where you might find butterflies roosting—spots where they can look out over the adjacent fields. Similarly, you can sometimes find a cluster of flowers in a meadow where butterflies will congregate.

**hilltops**—Many male butterflies like to roost near tops of hills where they can patrol their territory and spot trespassers or possible mates.

**next to water**—Butterflies need water and many will settle along streambeds to drink. Walk along the edge of a stream or lake and you may come upon a group of butterflies gathering to drink.

**utility lines**—Utility workers usually keep the area under power (or gas) lines cleared as the lines wind through the countryside. Because these areas are cleared of brush, flowers have a chance to grow and nearby woods offer refuge to butterflies.

**country and dirt roads**—If you can find a place to park and walk along a county road, you'll have a decent chance of seeing butterflies alongside the road. This allows you to photograph without trespassing on private property.

**trails**—I've learned to lag behind a group of hikers as they walk down a trail. Butterflies will fly up and away as the group passes them, then I watch to see where one or more settles down after the group





The Blue Morpho (*Morpho peleides*) is found in Central and South America. It is spectacular to see when it is flying.

has passed. That gives me a few nice shots before I have to catch up with the group again.

**parking lots**—When taking a tour, ten or fifteen minutes usually elapse between when the guide announces it is time to get back on the bus and when the last straggler actually gets on board and the bus takes off. When that happens, I load my gear back onto the bus, then hop out and scout the area. I usually find something and have plenty of time to take some additional pictures while people are getting organized.

**where you'd least expect**—I was on the top deck of a cruise ship entering the Panama Canal early one morning when a little skipper landed on the railing next to me. I once found a Gulf Fritillary hiding under a poinsettia plant in the Hawaiian Islands—thousands of miles from its typical range. (And I never saw a single butterfly indigenous to Hawaii!) These things happen a lot, so be alert.

These are some of the places where I have found butterflies in the past. After years spent wandering around in fields, I do have a few suggestions for your own personal safety. First, wear good hiking boots. This is not the time to wear flip-flops. I also tuck my pants into my socks to avoid ticks—especially deer ticks that are common where I live. I have a pair of hunting pants from L. L. Bean that actually are designed to foil ticks and I wear them quite a lot. I've been extremely lucky, but I rarely have found a tick on me in many years of hik-

ing. You need to also be aware of snakes when wandering around. The biggest pests I've encountered? Chiggers, "no-see-ums," and mosquitoes—especially in the coastal areas of North and South Carolina, Georgia, Florida's Everglades, and Alaska. I'm sure you have your own stories to tell.

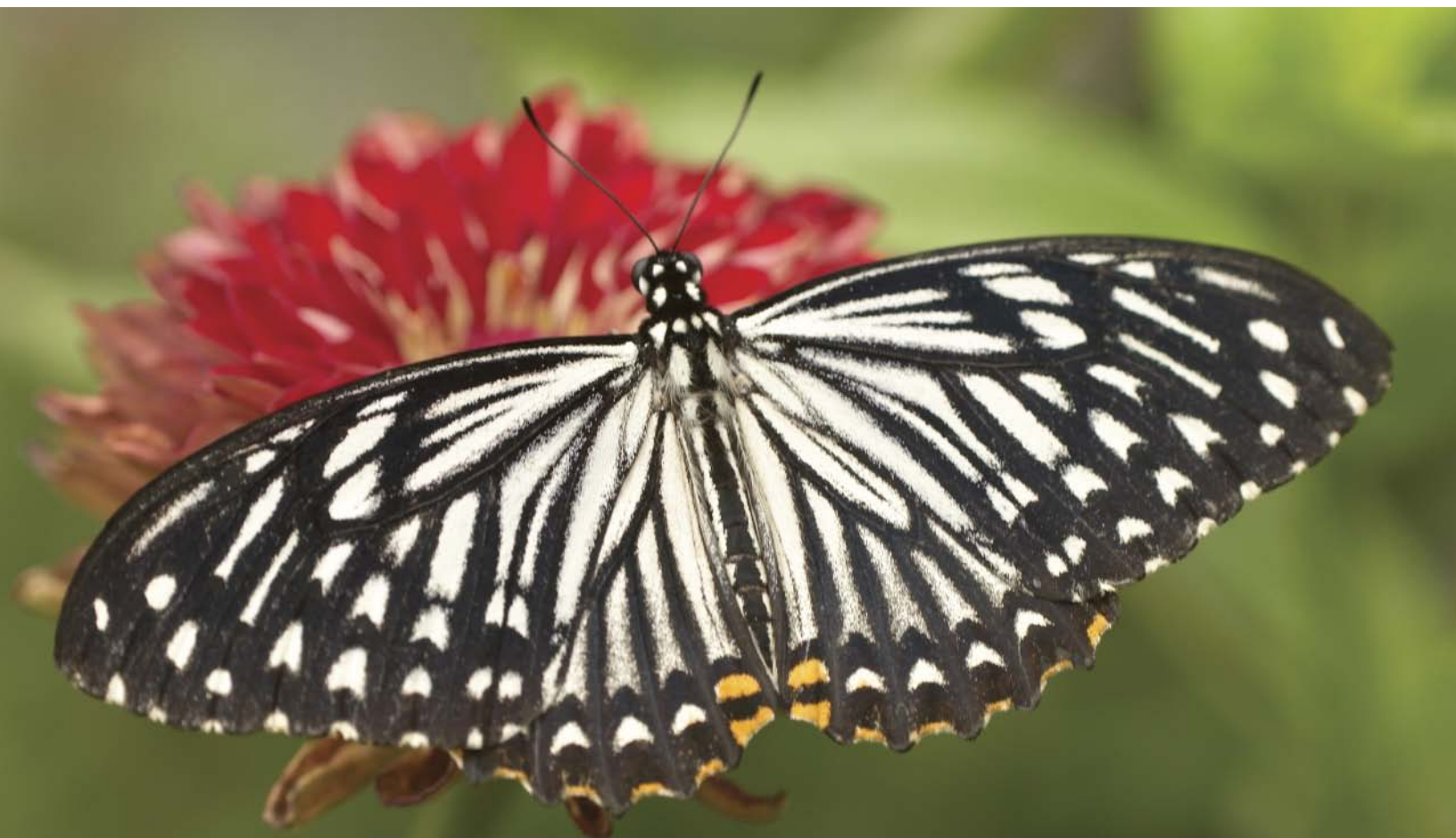
**Home/Studio.** Interest in home studio photography of dead butterfly specimens that are pinned or glued to flowers (or butterflies chilled in a refrigerator and placed on a flower where they huddle motionless until they warm up) appears to have diminished in the past decade. This is probably because it produces stilted and unnatural poses that simply fall short of what is demanded by publishers. The pictures simply did not work.

Capturing the emergence of a butterfly—from its chrysalis until it is ready to fly off—does offer some interesting potential for home or studio butterfly photographs, though. This is a process that can be easily captured with some advanced planning. The chrysalis becomes darker or transparent just before the butterfly emerges. From there, the whole process will only take a few minutes.

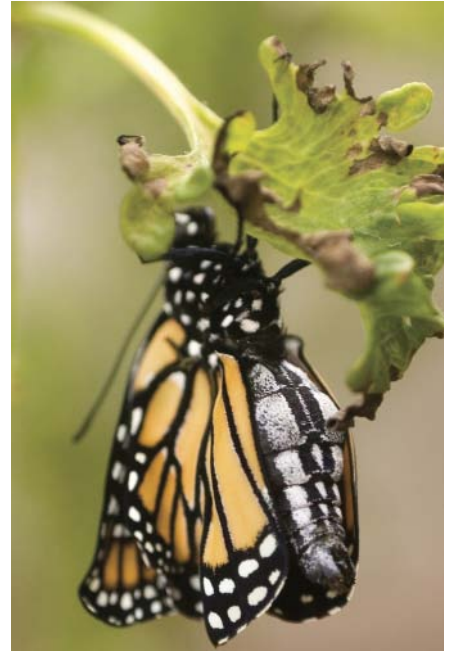
If you decide to try this, place the chrysalis on the leaf of a potted plant where you can easily see it. Then, position the leaf (in a potted plant for example) against a natural background. Keep the background as simple as possible (a solid green, for example). Ideally, the background should also be five to six feet behind the pot. That will result in a gentle, blurred look that won't distract from your subject.

Place your camera on a tripod within a few feet of the chrysalis. Do a few test shots to make sure everything is working. If possible, use a cable release to trigger the shutter. If you have several flash units (equipped with a slave unit or

An exotic Swallowtail rests on a flower at Brookside Gardens in Wheaton, MD.







This series of photographs shows a Monarch (*Danaus plexippus*) emerging from its chrysalis and hanging upside down while filling its wings with a fluid that unfurls and expands the wings. When this dries, the butterfly is able to fly away. The first image was taken shortly after the butterfly had emerged. The second image was taken a minute later. By the third minute, the butterfly had climbed up away from the chrysalis and was beginning to pump fluid into its wings (note the full abdomen). After five minutes and seven minutes the wings had almost filled out. In the final image, taken ten minutes after the butterfly first emerged, the Monarch was ready to fly off.

ones that can be commanded by the primary flash), place them off to the sides (at a 45-degree angle for even lighting). If you can manage it, aim a third flash at the background.

The metamorphosis takes only a few minutes, so you'll have to be ready. The butterfly will break out of the chrysalis and will then hang upside-down while swallowing air to help pump fluid into its veins. It takes another few minutes for the veins to fill and the wings to unfold and harden. Once hardened, the butterfly will be ready to fly.

The above sequence of photographs shows the emergence of a Monarch (*Danaus plexippus*) outdoors over a period of about fifteen minutes.



All major authorities on butterflies, including the Lepidopterists' Society, the North American Butterfly Association, and the Xerces Society, strongly oppose releasing butterflies purchased from butterfly farms into the wild. They recommend that any butterfly that emerges be placed in a freezer and frozen and not be released. The solution is to seek out a local butterfly club to see if you can obtain the chrysalis of a local species, or look in your own garden. As you grow more interested in photographing butterflies, you will realize that you must respect the needs of the butterfly more than your need to take a photograph.

This image was taken shortly after the emergence of the butterfly shown on the facing page.





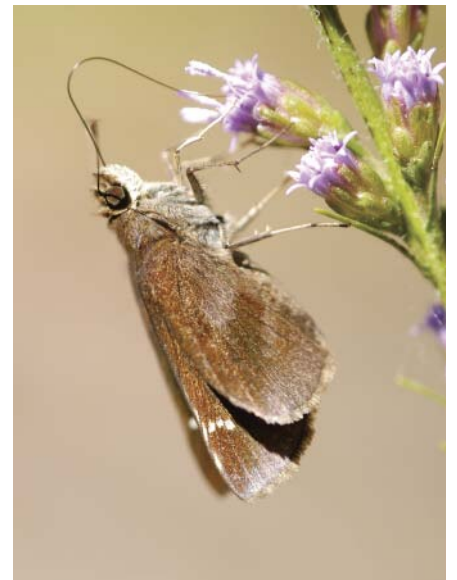
## 4. When to Photograph Butterflies

Once you've learned where to find butterflies, it's time to learn when you'll have the best opportunities to photograph them. The more you understand butterfly behavior, the better the odds that you will be able to take great pictures.

### The Best Time

**Best Time of the Day.** I started out primarily as a bird photographer. That meant I got up early and photographed birds feeding from about 5 or 6AM until they flew off to roost and digest their meals at about 9 or 10AM. They would also return to feed in the late afternoon and early evening. That left a huge gap in my day. The solution? Photograph butterflies. Because butterflies must warm up before they can fly, 9 or 10AM is when they get moving—and they fly until late afternoon or early evening! For an outdoor photographer, that means you now have a full day's activity! (*Note:* In warmer climates, the optimal temperature for butterfly activity is reached earlier in the morning than in northern climates. This is one reason why your home garden is such a valuable educational tool; you can easily record when the butterflies first appear and when they leave for the night.)

**Best Time of the Year.** Because butterflies must warm their bodies before they can fly, most of their activity takes place once the temperature has risen above 60° Fahrenheit (F) or 16° Celsius (C). For those living in the mid-Atlantic region of the United States, this means that we begin to see the first butterflies emerging in April (of course, there are always a few individuals who emerge in March) and their numbers grow as the weather gets hotter. July through September is usually the busiest time. With the onset of cooler autumn weather, activity starts to decline—except for a few hearty butterflies who appear in September and October and who sometimes can be found as late as



A Clouded Skipper (*Lerema accius*) sips nectar with a long and flexible proboscis.

November. Once temperatures start to fall below 50°F/10°C with the approach of winter, butterfly activity will cease and will resume only when the temperatures rise the spring. Don't discount the winter, though. Some butterflies, such as Cabbage Whites and Orange Sulphurs, are very cold hardy and may be found during brief warm spells in midwinter!

**Good Years and Bad Years.** Butterflies are affected by adverse weather conditions. Unusually mild weather in January lures a lot of caterpillars into thinking spring has arrived (temperatures reached 80°F in our region in the winter of 2006!). When this happens, many emerge only to die when temperatures plummet back below freezing a few weeks later. As warmer weather becomes more common, the effects of climate change will increasingly disrupt butterfly populations. Changing weather patterns—heavy spring rains or a protracted



The European Cabbage White (*Pieris rapae*) is a non-native species introduced from Europe into the United States in the 1860s. It is now widespread in North America. It is one of the heartiest species and is usually one of the first to emerge in the spring and one of the last to disappear in the fall of the year.





A Brown Clipper (*Parthenos sylvia*) resting on a flower.

drought—also adversely impact the growth of flowers that butterflies feed upon after their emergence. Evolution has timed butterfly emergence to the availability of food sources and host plants; if those plants have not bloomed or have died off, that crop of butterflies cannot survive. Fortunately, many butterflies can emerge later in the year when conditions, hopefully, have improved.

**Best Weather.** Butterflies like it when it is hot and sunny with few clouds and only a little breeze to stir the air. These are ideal conditions for butterflies and bees, and this is when you will find them most active. Sometimes, a passing cloud will obscure the sun briefly and some butterflies will settle down briefly to conserve energy until the sun re-emerges and they resume their quest for nectar or mates.

The best time for butterfly photograph is when the temperature has reached 75°F to 85°F (24° to 29°C) and the butterflies are fully active.

Can it get too hot for butterflies? Based solely on my own personal observation, I've seen a decline in activity once the temperatures have soared above 95° F (32°C) in the humid eastern states—but I've seen lots of activity in the western states where the humidity is lower and the air hotter.

Butterflies don't like windy days because it's hard to hang on to flowers while being tossed back and forth. They also don't like overcast days, although

they can be found—they're just not as active or abundant. When it rains, they hide under leaves or in a crevasse.

As with everything, there are exceptions. For example, the Costa Rican Clearwing lives in the deep reaches of rain and cloud forests where it thrives in pretty dark conditions. You'll need to look for them in dark shadows and not bright daylight. Many of the tropical butterflies are used to rain and remain active as long as there is not a drenching downpour. Again, the only predictable thing about butterflies is that they are unpredictable.

### **The Beginning of Life**

**Ova.** Unless you are extremely serious about documenting butterflies in your region, you probably don't want to photograph eggs or egg clusters. These are interesting for documentation, but not something most photographers want to cover.

**Caterpillars.** Once they emerge from their eggs, the tiny caterpillars (or larvae) go through five different stages, called instars. Gradually, they reach a size where they can be easily seen—and caterpillars all have unusual markings that help in their identification. They continue to eat voraciously, growing larger and larger until they outgrow their "skin" (actually an exoskeleton or cuticle). Once that happens, the caterpillar molts or sheds its skin and sucks in air to enlarge the new soft cuticle before it hardens.

A lot of people enjoy finding their first caterpillar, but just as many will run to get the spray can to get rid of those nasty pests. Thus, there is some ecological reason for some of you to photograph caterpillars in your area, because you can help show others what they are killing when they spray their bushes at the first sight of a caterpillar.

**Chrysalises.** The time eventually comes when the caterpillar, having eaten all he can, wanders off to find a place where he can build his chrysalis (moths build cocoons). This is where the transformation from caterpillar to butterfly takes place. This metamorphosis can take two to three weeks.

**Emerging Butterflies.** A few days before the butterfly is scheduled to emerge from the chrysalis, the structure will become transparent or will darken. Being in the right place at the right time—especially in the wild—is a matter of luck. However, if you can visit the same chrysalis over many days, you might be fortunate to photograph the emergence of the butterfly. Finding butterflies emerging in the wild takes patience and a lot of looking and repeat visits to the site.

**New Butterflies.** Photographing new butterflies is a very rewarding experience. Their colors are deep and bright. Their wings are whole, with no torn or missing parts. Sometimes—every so often—the newly emerged butterfly will even fly to a nearby bush or flower and sit with their wings expanded to soak in the warmth of the sun. What a perfect time to photograph them!

Finding butterflies emerging in the wild takes patience and a lot of looking and repeat visits to the site.



## Basking

One of the best photographs of a basking butterfly I ever saw was taken by a young Dutch boy who took a photograph of a butterfly he found not far from his home. It was early in the morning and the butterfly was drenched in dew. The boy won an award from *Nature's Best* magazine for that stunning image.

I have tried in vain to photograph similar images, but have never succeeding in finding where these butterflies are—but I've come close. In the chill of early morning, butterflies can sometimes be located close to the ground, clinging to blades of grass or slender stalks. They are usually covered with water drops and can't fly. If you don't mind getting wet, you can lie down on your stomach and get some fairly good shots. Be careful, however; a frightened butterfly will simply drop to the ground, making it impossible to photograph. You obviously can't pick it back up and place it on a flower, because that would destroy all those delicate dewdrops.

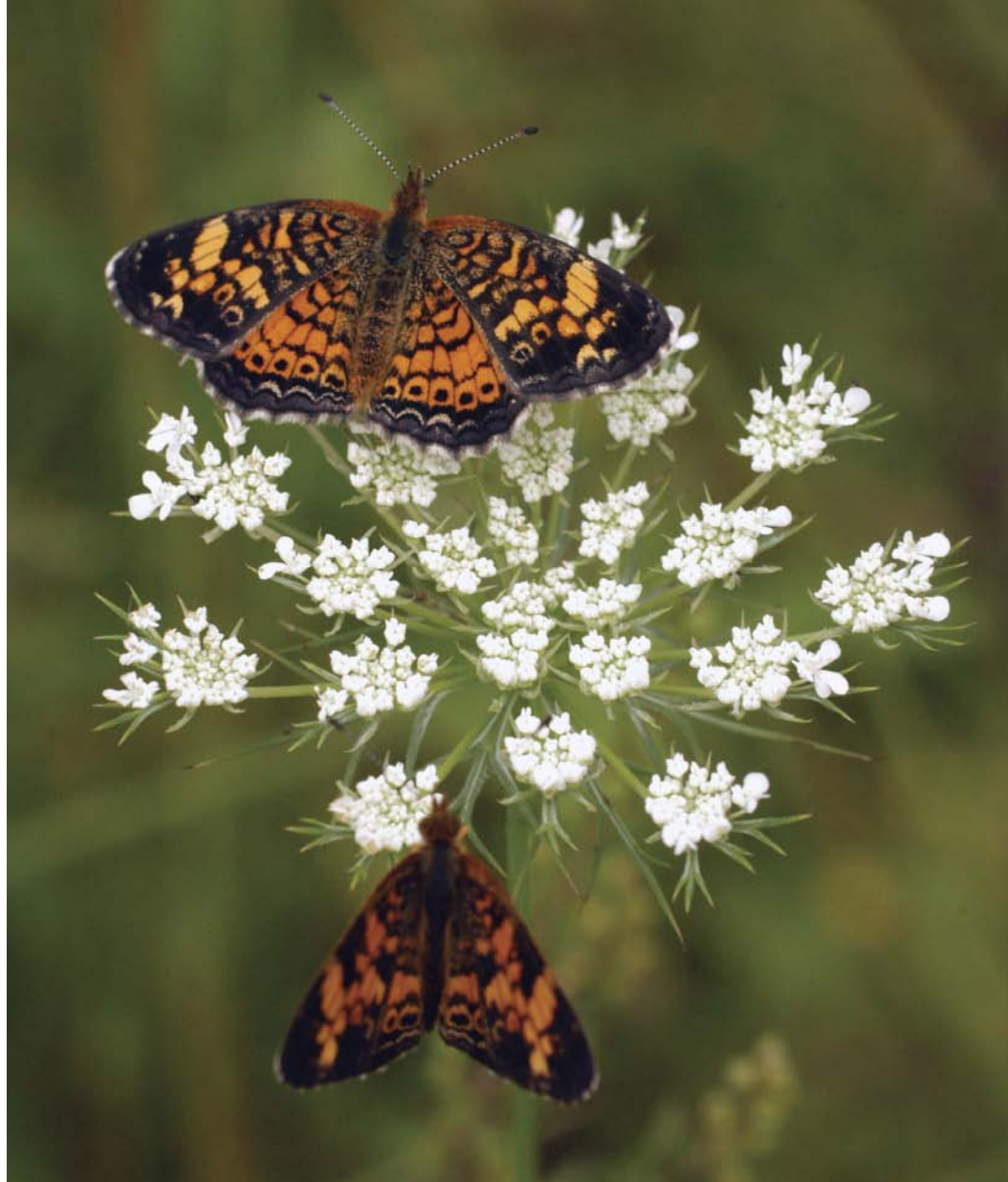
Basking butterflies will try to align their wings to the sun's rays. Some will keep their wings close at right angles to the sun (lateral baskers). Others open their wings and align themselves for maximum exposure (dorsal baskers). Once they warm up, they are off for the day.

A Meadow Fritillary (*Boloria bellona*) basks on a sunny day in a field in the Blue Ridge Mountains early in the season.





This pair of Pearl Crescents (*Phyciodes tharos*) was so busy feeding that they did not see me approach (or perhaps I managed to stay outside of their fright zone). In either case, I easily approached them and began taking close-up photographs.



Because they move too fast, I usually don't recommend using a tripod to photograph butterflies, but this is one exception. If you have a tripod without a center column and can spread its legs out wide, that will allow you to get fairly low to the ground. Otherwise, consider resting your camera on a beanbag (some dry beans in a plastic baggie will work fine). This will keep the camera low to the ground but reasonably steady while you are taking your pictures.

### **Feeding**

One of the best times to photograph butterflies is when they are feeding. Adult butterflies require great quantities of high-energy nectar. Some butterflies also feed on various salts, minerals, pollen, and other organic foods during their short-lived existence. This need is so important that some butterflies will tolerate a close approach.

Understanding butterfly behavior gives you the information you need to succeed where others can't. If you combine your knowledge of butterflies with



A female Great Mormon (*Papilio Memnon*) resting.

a basic knowledge of plants, the chances of getting better and better photographs increase dramatically. I began this book by talking about the importance of your home garden. This is exactly where all three conditions come together: (1) you know what butterflies to expect and when to expect them; (2) you know which plants they will nectar on and which plants they will use as a host to lay eggs; and (3) you know your surroundings (e.g., there is a damp spot where they like to gather to drink, and over there is an area where they gather to sip salts from the ground).

Once you've identified a butterfly hot-spot, carefully watch to see exactly how long the butterfly stays. One second? Five seconds? Longer? Will it fly away, visit two or three other flowers, and then return? Armed with that information, you can plan your strategy, knowing that you either have only the briefest of time or confident that you have a few extra seconds to take pictures.

If your subject is fully occupied with feeding it should tolerate a fairly close approach. If it flies off as soon as you draw near, you have to reevaluate your approach. Either you are moving too fast, you cast a shadow, you are wearing colors that are too bright, or you need to consider a lens that will allow you to take photographs outside of their fright or flight zones. We'll discuss these issues a bit later in this book (see page 59).

It can be very frustrating to spend a lot of time patiently moving into position only to have the subject fly away just as you are ready to snap the shutter.

Sometimes it isn't going to work. I've learned to accept that. Sometimes it just takes a bit of patience. If you can't start photographing in ten to fifteen minutes, then it's time to move on; the butterflies are simply too skittish.

**Nectar.** Many butterflies (but not all) use flowers as their source of nectar. Their behavior when feeding typically involves a quick test to see if they like the flower's nectar. If they do, they may pause and sip for just a few seconds—

sometimes five seconds, sometimes ten seconds. If they stay longer, they usually will take a circular path around the flower sampling nectar as they move.

It can be frustrating to spend  
time patiently moving into position  
only to have the subject fly away.

Keep in mind that butterflies can see light in the ultraviolet spectrum. What might appear to be a solid white flower to you, when exposed to ultraviolet light, will depict patterns that help direct butterflies to the source of the nectar. These light pat-

terns also help butterflies identify potential mates. This helps explain why some butterflies prefer white, purple, and yellow flowers while others might be attracted to orange, reds, and blue colors.

Butterflies also appear to have a seasonal preference for flowers. At Meadowlark Botanical Gardens in Vienna, VA, there is a butterfly garden with four large butterfly bushes (*Buddleia*). One is white, one is yellow, and two are purple. In some years, the white plant attracts more butterflies than the purple ones; the next year, it's just the opposite. Sometimes the butterflies are attracted to an adjacent cup plant, which is bright yellow, but will totally ignore the yellow *Buddleia*. I've heard from many gardeners that in some years butterflies will ignore some of the plants in their gardens, but in subsequent years they visit these same plants in droves. Similarly, in some places, similar flowers may attract butterflies in numbers, while in other places the same flower will be ignored. Soil type and moisture may have an effect on nectar quality that is not immediately evident to humans.

**Fruit.** There are several species of non-nectaring butterflies that feast on rotting fruit, along with some nectaring butterflies that are attracted to the

### ***Butterfly-Attracting Flowers***

Certain flowers attract more varieties and numbers of butterflies than others. Some of the most popular found in the United States include: Aster, bee-balm, black-eyed Susan, borage, butterfly bush, butterfly weed, common zinnia, coreopsis, cosmos, daisy, daylily, flowering tobacco, French marigold, honeysuckle, goldenrod, Joe Pye weed, lantana, lavender, liatris, mint, orange milkweed, pentas, petunia, phlox, pincushion flower, purple coneflower, rosemary, spike gayfeather, stonecrop, sunflower, and wax-leaf privet. Other species in other locales will have their own favorites. Visit a garden center or botanical garden and talk to a horticulturist. The appendix section also includes a few books that will help you plan your own garden.





pungent odor. The autumn months are an ideal time to find fruit rotting on the tree or vine and littering the ground beneath the tree or plant (apple orchards are excellent). This food is a great bonanza for butterflies, because the juice oozing out of rotting fruit is very easy for butterflies to feed upon.

If you visit a butterfly house, you will likely find platters containing rotting bananas, melon, oranges, peaches, and slices of watermelon that attract non-nectaring butterflies. It makes a great picture. Homeowners can experiment with leaving rotting fruit out to attract butterflies—but beware: you’ll probably attract ants, flies, hornets, wasps, snails, birds, opossum, raccoons, skunks, and other hungry critters, too!

A wiser, albeit long-term effort would be to plant a few fruit trees (apple, pear, peaches, cherry, or figs) or a few fruit-bearing bushes (blueberry, raspberries, etc.) that will also provide food for birds and other hungry animals.

**Sap.** Woodland butterflies are attracted to the sweet taste of sap. Woodpecker holes will frequently drip sap that attracts Anglewings and Tortoiseshells. These two groups of butterflies can also be seen in the early spring as sap starts rising into trees. You might experiment by smearing some maple syrup on local trees close to your house; it might work, but it is also like to attract pests before the butterflies.

**Sugar Water.** When I first started out, I would sometimes place a drop of sugar water on a flower in hopes of keeping the butterflies in place for a while longer. Sometimes it worked, but you could usually see the sugar water in the image and I didn’t like that result. Eventually I grew pretty proficient at pho-

Mourning Owls (*Caligo eurilocius*) from Central and South America cluster around rotting fruit set out daily during the summer months at Brookside Gardens in Wheaton, MD. You can try setting out fruit to attract butterflies to your home, but don’t be surprised if all you find are ants, bees, flies, and wasps.

tographing them and have not tried sugar water in many years. If you would like to try, combine one part sugar with eight or nine parts of water. Apply the mixture with an eyedropper or sponge and try and push the mixture down into the flower so it is not too visible. This method is useful when you mount your camera on a tripod and fix it upon a single flower. You'll have to wait until

The butterfly will probably stick  
around for a while, enjoying  
the unexpected treat . . .

someone shows up, but the butterfly will probably stick around for a while, enjoying the unexpected treat while you fire away.

A few garden stores carry butterfly feeders that hold sugar water. The idea is that butterflies will feed from them, just as hummingbirds do. I've never seen one that worked, but there is always that chance. I'd be more inclined to lure butterflies to a garden rich with sources of natural nectar than to a plastic feeder that would only produce minimally acceptable images.

**Honey Dew.** Wood Nymphs, Admirals, and a few other butterflies feed on "honey dew" produced by aphids. So, even aphids serve their purpose in the garden bringing in butterflies you might not ordinarily see. If you have an infestation of aphids, see about purchasing a box of live ladybugs. That's the nat-

This Cassius Blue (*Leptotes cassius*) thrived in a retirement community in Florida until the groundskeepers sprayed its plumbago host plant with pesticides because of a whitefly infestation (they could have used soapy water!). The poisons were so effective that it took over five years before these little Blues began to return. Once a population is destroyed, it takes a long time to recover.



ural answer—please don’t grab for the bug spray and blast away. Aphids are insects and so are butterflies; both will die. I recall one incident in a community in Naples, FL, that was suffering from a bad infestation of whiteflies on certain plants. The solution? Spray. Unfortunately, the plant was home to thousands of Cassius Blue butterflies. For the next five years, I never saw a single Cassius Blue throughout the property. Eventually, they returned, but it took many years for the population to begin to rebuild. Once you destroy a population of butterflies, it takes a very long time for it to recover.

**Beer and Molasses.** I’ve read about successful efforts to attract woodland butterflies in the Nymphalidae family (Mourning Cloaks, Anglewings, and Satyrs) using a mixture of stale beer, diluted molasses, and brown sugar. When I first began photographing butterflies at Meadowlark Botanical Garden, I spent an entire summer setting out this mixture in large pots next to the woods. I attracted lots of ants, bees, and flies, but no butterflies. It’s possible they *did* go there to feed, but unless you can monitor your lure throughout the day, it would be difficult to know for certain. I eventually concluded that we simply did not have a large enough population of woodland butterflies and gave up on the idea.

**Salts.** Male butterflies, especially Admirals, Anglewings, Blues, Fritillaries, Emperors, Satyrs, Skippers, Swallowtails, Sulphurs, and Cabbage Whites, all need sodium in order to successfully mate. You can sometimes find clusters of males gathered around a dry spot (so they are not drinking), but where they are clearly gathering something: salt. I used to visit a site along a country road in South Carolina where flocks of male Eastern Tiger Swallowtails would gather every year. At Meadowlark Botanical Gardens, we will occasionally see a Red-Spotted Purple butterfly busy feeding on salt between the bricks of the walkway leading to the Visitors’ Center. During the winter months, the grounds-keepers spray salt to keep ice from forming, and that’s what the butterflies are going after.

**Other Foods.** Butterflies are insects—pretty insects, but insects nonetheless. They will feed on things that flies feed upon: carrion, excrement, urine, as well as other minerals found in the soil. A Red-Spotted Purple was once seen feeding on wet paint! Very few of these items yield pretty pictures, but it does help alert you to the presence of butterflies.

## Drinking

Butterflies also have to absorb moisture and they frequently gather in small groups to drink. This activity is called “puddling.” Sometimes it is hard to tell if they are drinking or absorbing minerals. You’ll find this activity along the edge of streams and rivers, ponds, and lakes. Sometimes they’ll even gather around a rain puddle. Butterflies won’t actually go into the water. They prefer to keep their feet dry, so they merely stick their proboscises down between the rocks or sand to sip up the water.

Once you destroy a population of butterflies, it takes a very long time for it to recover.



A Question Mark (*Polygonia interrogatio*) rests on a dry stone while sipping water from the muddy banks of a river. Butterflies don't use birdbaths, because they don't like to get their feet wet. A little muddy area in a garden is all they need.



If you'd like to provide a source of water for butterflies in your garden, try filling a container with small pebbles. The container should be shallow enough to let the sun evaporate all the water during the day; during the night dew will form on the pebbles and give the butterflies a chance to drink. When you allow the container to dry out during the day you avoid problems of mold and mildew that might hurt the butterflies. Place the container next to some shrubs to protect the butterflies from birds seeking a bath.

### **Resting**

After a hearty meal, butterflies like to rest. Moments earlier they were busy fluttering from flower to flower. Now they are resting on or under a leaf. Some will sit there for a fairly long time until they are ready to go back out to seek



After feasting on pears, this Gemmed Satyr (*Cyllopsis gemma*) was initially difficult to approach—it flew off in all directions whenever I got near. But it returned to the same area after flying around for a while. I lowered myself to the ground and gradually crept closer until I was in range. The results were great.

mates, eat, or drink. This is a good time for a cautious approach. One problem I've faced is that there always seems to be something between my camera and the butterfly, usually a small twig or blade of grass. When this happens, I try to maneuver my hand down low to the ground and bend the offending twig out of the way without scaring the butterfly. Sometimes it works.

### Perching

Butterflies, much like dragonflies, sometimes like to perch in a favorite spot. Viceroy's often select a prominent shrub in an open area, resting on the tip of the topmost branch. They will fly off and return to the same spot. Sometimes they will rest. Sometimes they will simply keep a lookout for receptive females or trespassing males. If you are lucky enough to find a favorite perch, you can set up a camera with a tripod, wait until the butterfly gets used to the apparatus, then begin taking some pretty good photographs—slowly moving closer and closer getting better and better close-up shots.

### Roosting

Butterflies hunt for places to sleep each night, and they are pretty ingenious about finding good spots to hide. They will roost under large leaves, in the bark of trees, in crevasses, overhangs, logs, or even dense vegetation. They spend the night well hidden from predators. A few years ago, Meadowlark Gardens faced a serious problem with foraging deer. They erected plastic fencing around some of the smaller gardens. The fencing curled over at the top, and each morning you could find large swallowtails roosting under these flaps, totally visible but apparently secure. The staff would walk around unfurling the lightweight plastic and letting the butterflies fly away. (*Note:* Most butterflies are solitary creatures, but the *Heliconius* species is the exception. In the United



States, particularly in Florida, you will find colonies of Zebra Longwings that gather each evening to spend the night in the same spot.)

### **Shelter**

Butterflies don't like getting rained on, bounced around on windy days, or when the weather gets a bit too chilly. They'll find shelter under leaves, branches, or woodpiles. If you can find them (and that's a big *if*), they will sit for hours. You'll have a great opportunity to photograph them while they shelter. Some gardening stores even sell butterfly shelters—wooden boxes with narrow slots in the front that are supposed to attract butterflies. The principle is sound, but I've never heard of anyone having success with those boxes. It wouldn't hurt anything if you tried one out, though.

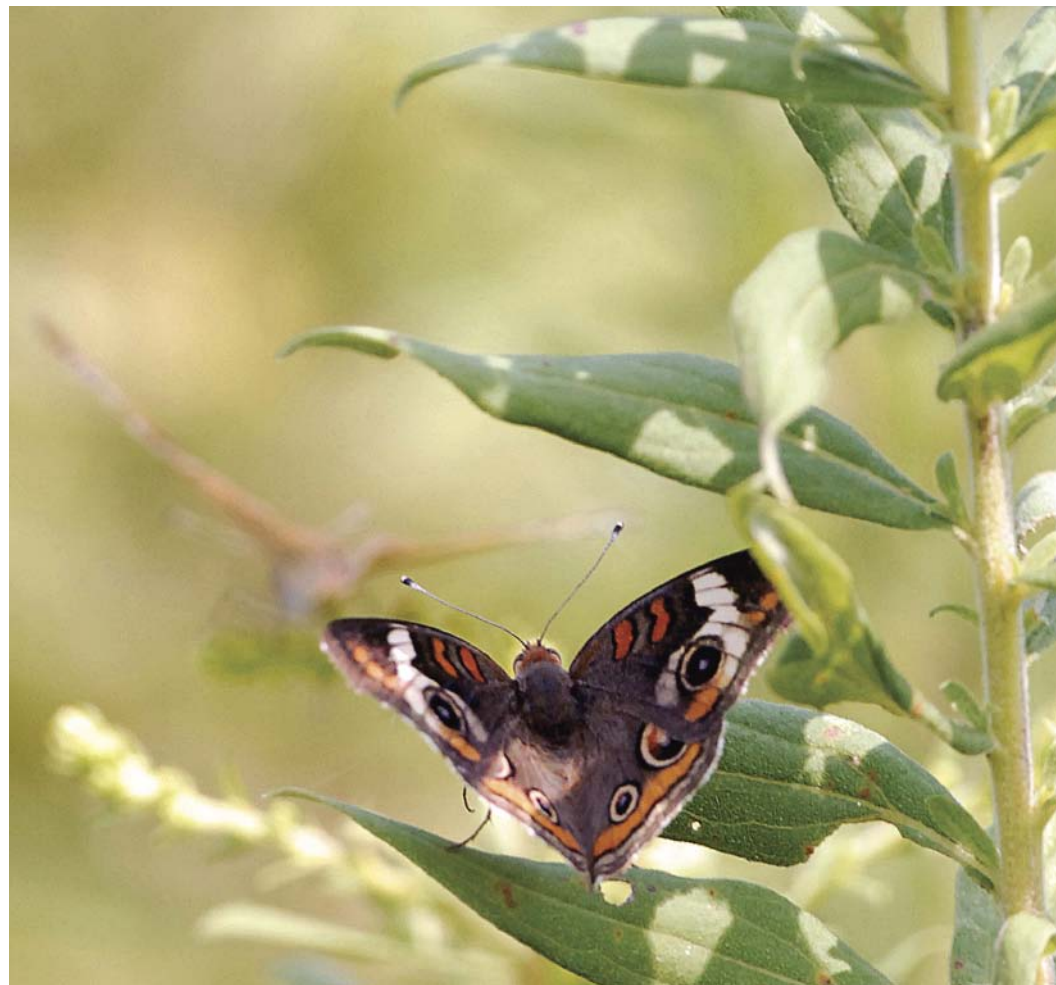
### **Patrolling**

Male butterflies will sometimes patrol their territory, looking for willing females and watching for challengers who must be driven off. Butterflies patrolling are moving too fast, too erratically, and too high to bother photographing. Perhaps you will see them return to their favorite perch. Some butterflies use “flyways” down a river, for example that help them avoid vegetation. It's sort of a highway in the air used by birds and butterflies.

### **Spiraling**

When a territorial male spots a rival male invading his “space,” the result is usually some form of combat. These are usually short bouts that result in a lot

A Common Buckeye (*Junonia coenia*) watches the approach of an intruder before engaging him in combat. These aerial jousts last a few seconds. Then the victor returns to his perch to keep watch out over his territory.





of zigzagging motion all over the place. Sometimes, the butterflies fly up in a series of spirals. Once they have sorted out their issues, the victor returns to his favorite spot where he can watch for other intruders. Skippers, in particular, are always fighting. This makes it incredibly hard to photograph them, so don't bother if they are in a combative mood. There are usually plenty of skippers around, so find one who is feeding quietly to photograph.

### **Courtship**

Butterflies have courtship rituals in which the males perform a little series of dances next to the female or hover around her to see if she is receptive. This



A male Fiery Skipper (*Hylephilia phyleus*) engages in a courtship dance. The male (beneath the female) dances around the female until she agrees to mate or flies away. Sometimes, several males will attempt to attract the interest of a single female. That usually ends with the female leaving.



Eastern Tiger Swallowtails (*Papilio glaucus*), while mating, can be approached fairly closely. However, they will fly off if you approach too closely.

dance rarely lasts more than a few seconds and the female usually flies off in search of a better partner or to find something to eat. As a result, courtship is a pretty difficult thing to photograph.

### **Mating**

If the courtship goes smoothly, mating occurs. Once butterflies begin to mate, it will take a while to complete the process. During that time, the two butterflies are locked together and are intent on their activity. This will allow you to approach the pair and begin photographing. Be aware, however, that if you approach too closely, they can fly away—still joined together. So, move in close, but do so slowly.

### **Looking for Host Plants**

Females who have mated have the task of finding suitable places to lay their eggs. Some will fly zigzag patterns all over the place looking for just the ideal spot. This constant zigzag as the female searches for the right host makes for very difficult photography and isn't worth the effort. Once she identifies a candidate, she'll land and test it to see if it meets her requirements—after all, she wants the right host plant and she wants to make sure someone else hasn't gotten there first and laid their eggs. Butterflies have chemoreceptors on the bottom of their feet and on their antennae that allow them to detect odors from the right plant.





### Depositing Eggs

When the female finds a suitable plant, she'll bend the tip of her abdomen down to the surface of the leaf (or sometimes under the edge of the leaf) and start laying eggs. This is called ovipositing. Some lay a single egg. Some, such as Mourning Cloaks, may lay clusters of from ten to three-hundred eggs. Blues will lay their eggs on unopened flower clusters.

There is a problem associated with photographing females laying eggs, though. Usually, the top part of the butterfly and leaf is in bright sunlight, while the lower part of the abdomen (where the eggs are being deposited) is in light that is a couple of stops darker. Here, using a muted fill-flash or a reflector can help. Take lots of shots from several different angles to come away with a good image.

### Migration

One of the final stages in butterfly photography is the migration of Monarchs from the northern parts of the United States and Canada down to their wintering grounds in Southern California (western Monarchs) and Mexico (eastern Monarchs). You'll find growing numbers of Monarchs following flyways down the east and west coasts as the migration builds. In the late fall you can find hundreds and hundreds of Monarchs stopping along the route to gorge themselves on nectar needed for the flight. It's an exciting finish to the butterfly season and is worth the effort to photograph. Cape May, NJ, is famous for migrating Monarchs in the fall.

LEFT—A Cassius Blue (*Leptotes cassius*) laying eggs (front view). RIGHT—A Cassius Blue (*Leptotes cassius*) laying eggs (back view)



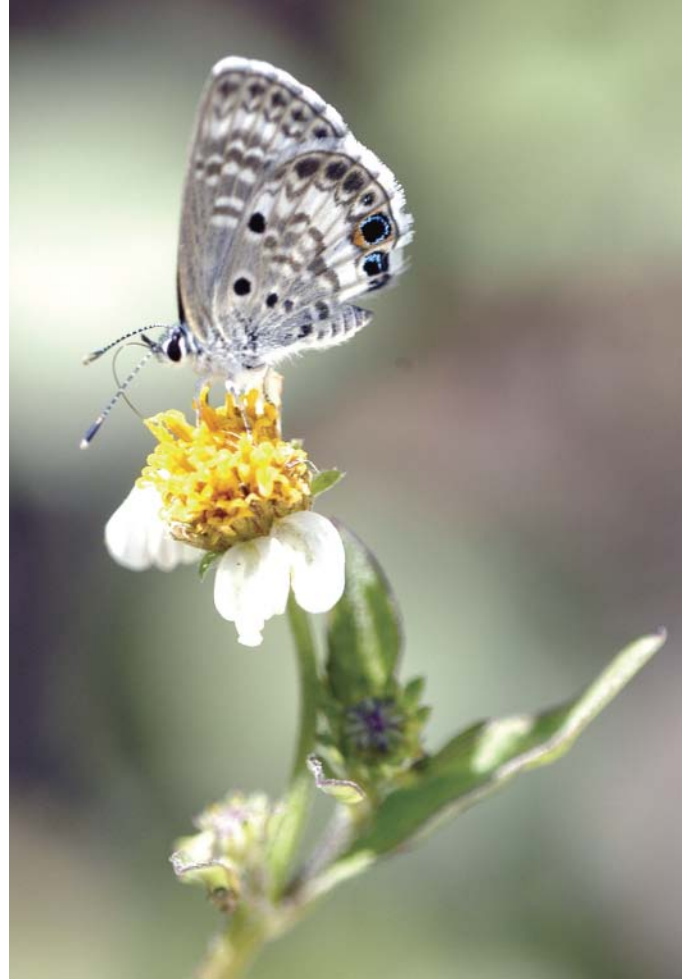
These Monarchs end their migration at their winter roosting areas, where millions of Monarchs gather in trees and warmer weather allows many—mortality rates are high—to survive the winter and begin the migration north the following year.

### **Final Days**

Most butterflies don't migrate and have a life span ranging from from a week or two to about a month. You will encounter battered and torn butterflies that have survived bird attacks. They look beaten, but they have fulfilled their life's mission: they have survived to propagate the next generation of butterflies. Most lay their eggs expecting that the next generation will survive. In the autumn, many lay their eggs on leaves that fall to the ground and form a warm barrier for the eggs (unless the lawn is swept clean by blowers and the leaves chopped up into mulch). For others, the caterpillars will move into the leaf litter, waiting for the sun to warm the earth before they emerge to begin the cycle of life over again.



This tropical Orange Tip has fulfilled its mission in life and now, battered and bruised, enjoys a few final hours of life.



## The Future

Mortality rates for butterflies are very high. Natural predators (parasitic wasps, spiders, praying mantises, and birds) take a tremendous toll on butterflies.

Man also plays a role. As noted previously, the warming of the globe, with warm, sunny weather in the middle of winter, fools many caterpillars into emerging early, only to be hit with Arctic weather. The application of pesticides and herbicides that produce sterile, lifeless lawns; aerial spraying for Gypsy moths; the loss of habitat with the demise of small farms and the constant demand for new homes, shopping malls, office buildings and parking lots—it all take its toll. The Xerces Blue, for example, was a brilliant blue butterfly that made its home at one small site near the Presidio in California. Its entire range was converted into a parking lot in the 1940s, making it the first American butterfly driven to extinction by man. All for the sake of a parking lot.

But, people can make a positive difference, too. If readers of this book will approach their local park authorities and indicate that planting native species will help restore local butterfly populations, that will be a great step in preserving butterflies for the future. Native plants are inexpensive and thrive in local conditions with minimal effort. It's a quick, inexpensive, natural way to help nature.

LEFT—A Gray Hairstreak (*Strymon melinus*) that survived a bird attack aimed at its false eyespot and antenna. Hairstreaks try to create the illusion that their head is located behind them to confuse predators. In this case, it worked and the butterfly lived. RIGHT—The Miami Blue (*Hemiargus thomasi*) was once found in abundance around Miami, FL. Unfortunately, its host plant, balloon vine is not very attractive and, like many “useless weeds,” was torn up and replaced by more colorful flowers as homes, offices, shopping malls, golf courses, etc., took over their habitat. Eventually, only one tiny colony remained at Bahia Honda State Park in the Florida Keys. Entomologists in Florida are now working to re-establish the Miami Blue in several sites in Florida. (Note: This butterfly is easily confused with the Cassius Blue.)

## 5. How to Approach Butterflies



You now have a reasonably good idea of where to find butterflies and when to photograph them. Now comes the hard part: getting up close and personal. Butterflies are erratic and usually difficult to approach (unless they are really feeding heavily or mating or

otherwise occupied). Thankfully, the worst that can happen is that your subject will flutter off just as you get ready to snap the shutter. Accept that fact and move along.

### Fright or Flight Zones

Butterflies, like all life forms, have an invisible barrier around them called their fright or flight zones. Enter the fright zone and they will feel uncomfortable. Get too close (entering the flight zone) and they will feel threatened and fly away. You can get amazingly close to butterflies, but once they sense your presence, they'll take off. The trick is to get as close as possible without intruding on their private space. It takes practice and extraordinary patience, but it can be done.

This Great Spangled Fritillary (*Speyeria cybele*) allowed me to approach within easy touching distance. With minimal movement and patience, I was able to blend into the background; I was just another bush waving in the breeze and nothing to be alarmed about. The sound of the shutter clicking apparently doesn't bother many butterflies.







A Dun Skipper (*Euphyes vestris*) testing a spring flower for something to feed on.

### **Slowly but Steadily**

You can approach them, however, by moving slowly and steadily. Part of the learning process is to determine how close you can get before (1) the butterfly flexes its wing in preparation for flight (some don't), or (2) it takes off. If it permits an approach, take your first photograph. Then, take another step forward and take another shot. Then move forward again until it either grows accustomed to you or it leaves.

### **Avoid Sudden Movements**

You can't move a lot once you begin your approach. This is not the time to answer your cell phone, look for your cable release, or fix your hat. You have to have everything ready, with the camera raised to your eye to start taking pictures. You can shift the camera slightly for a better view, but keep all other motions to a minimum.

### **Approach from Slightly Below**

As mentioned previously, butterflies have multifaceted eyes; facets at the bottom are used to assist in feeding, while those at the top are used to detect predators. This means that if you approach the butterfly from slightly below its eye level it will be less likely to perceive you as a threat. Obviously, that's not possible for all (or even most) shots—but you may be surprised at how easy it is to photograph a butterfly high up on a towering bush or vine when shooting from below.

### **Don't Cast a Shadow**

I've seen butterflies that totally ignore shadows. I've seen others flee the second they see a moving shadow. Shadows are a particular concern to photographers because (1) you usually want the sun to your back, which means you

This is not the time to  
answer your cell phone, look for  
your cable release, or fix your hat.

automatically cast your shadow in the direction of your subject, and (2) your camera also casts a shadow and it is almost directly in front of the butterfly. In addition to spooking the butterfly, the shadow may also intrude on the photograph, either complicating your exposure or producing an unwanted effect. So, be careful of your shadow and the shadow cast by your equipment.

If you want to locate butterflies, have someone walk ahead of you with their arms spread out casting a wide shadow. This will spook many butterflies into flight and you can watch where they land. You can even wave your own arms

This will spook many butterflies  
into flight and you can watch  
where they land.

over the ground, casting a shadow that might cause a butterfly hidden from your view to take off. You can then follow it to where it lands and try your luck taking another photograph. Sometimes it works and sometimes it just doesn't.

### **Blend in with Your Surroundings**

In the first incarnation of this book (*The Art and Science of Butterfly Photography*), I suggested that bright, colorful clothing is acceptable when photographing butterflies, especially shirts with flowers imprinted on the fabric. After another ten years of practice, I've concluded that dull green and brown clothing actually does a better job. The bright colors attract curious butterflies, but they soon lose interest and fly away. Dull clothing allows me to blend in. Soon they get used to me and see me as another bug or leaf moving gently in the wind. I can get better shots if I blend in than if I stand out.



Although I strive to blend in with my surroundings, butterflies are attracted to bright, colorful objects. However, I prefer my butterflies in a natural setting and so I avoid bright colors.

### **Move In, Move Out**

Perhaps the single most important lesson in this entire book is to move in and move out. As noted on page 59, butterflies have their own individual fright or flight zones. If you enter their fright zone, they will stop feeding and may twitch their wings in preparation for flight. If this happens, remain still. Hopefully, if you wear dull greens or camouflage, the butterfly will confuse you for a bush moving in the breeze. When they resume their activity, move in closer. Stop. Finally, with your camera firmly against your forehead, lean into the flight zone, take your photograph, and gently back out. The butterfly may be confused for a second but will just figure that you are a branch moving in the wind. You can keep doing that a number of times and it may (or may not) tolerate you approaching even closer.

### **Avoid Perfumes and Fragrant Lotions**

Avoid fragrant soaps, antiperspirants, perfumes and colognes, sun blockers, and bug sprays. When whiffs of coconut butter, rose, and lavender waft through the air, bees will come to investigate the heavenly smell, as will flies. Butterflies, on the other hand, are finely tuned to specific fragrances and are likely to react by taking off. So, if you want to photograph butterflies in the wild, use the fewest fragrances possible.

### Learn to Stand Still

It does get hard to stand still when it's 95°F outside and sweat is dripping off your nose, but you'll be a much better nature photographer if you can learn to do it. Remaining still helps you blend in with the environment and allows the subject to carry on with its natural activity.

### Know When to Quit

Sometimes you just have to throw in the towel and call it quits. Trying to photograph butterflies as they fly from flower to flower is extremely difficult (unless you have a really expensive flash system designed to capture flight). Chasing after a stubborn butterfly that simply will not tolerate an approach is a waste of time.

Butterflies often have very good camouflage. One side might be bright and colorful while the other looks exactly like the bark on a tree (look at the coloration of a Mourning Cloak as an example). For that reason, you also have to accept it when the brilliantly colored butterfly you have been following drops out of sight and completely disappears simply by closing its wings. It's frustrating, but it's reality.

It's also important to keep in mind that butterflies are wild creatures driven by their own agenda. Adverse weather or interference by man can have a dramatic impact on butterfly populations: they may not show up for one or two years. Sometimes never. When this happens, you need to accept your own limitations and try and help restore the butterfly habitats in whatever way you can.

### *An Important Tip*

If you photograph butterflies long enough, a bee or wasp *will* land on you to check things out. *Never* swat at a bee or hornet, even if it is wandering around on your face. They are generally just tasting your sweat and interested in nothing more. It takes tremendous willpower to stand there waiting. Eventually, if not disturbed, the critter will fly off in search of something else; hit at it and you will have an angry bee or wasp that will attack! The best advice is to gently blow at it. Wind is a natural part of the environment and the bee or wasp won't perceive it as a threat. It has happened a lot to me, but I've never been stung (yet!).



Peck's Skippers (*Polites peckius*) are found in abundance in Northern Virginia.



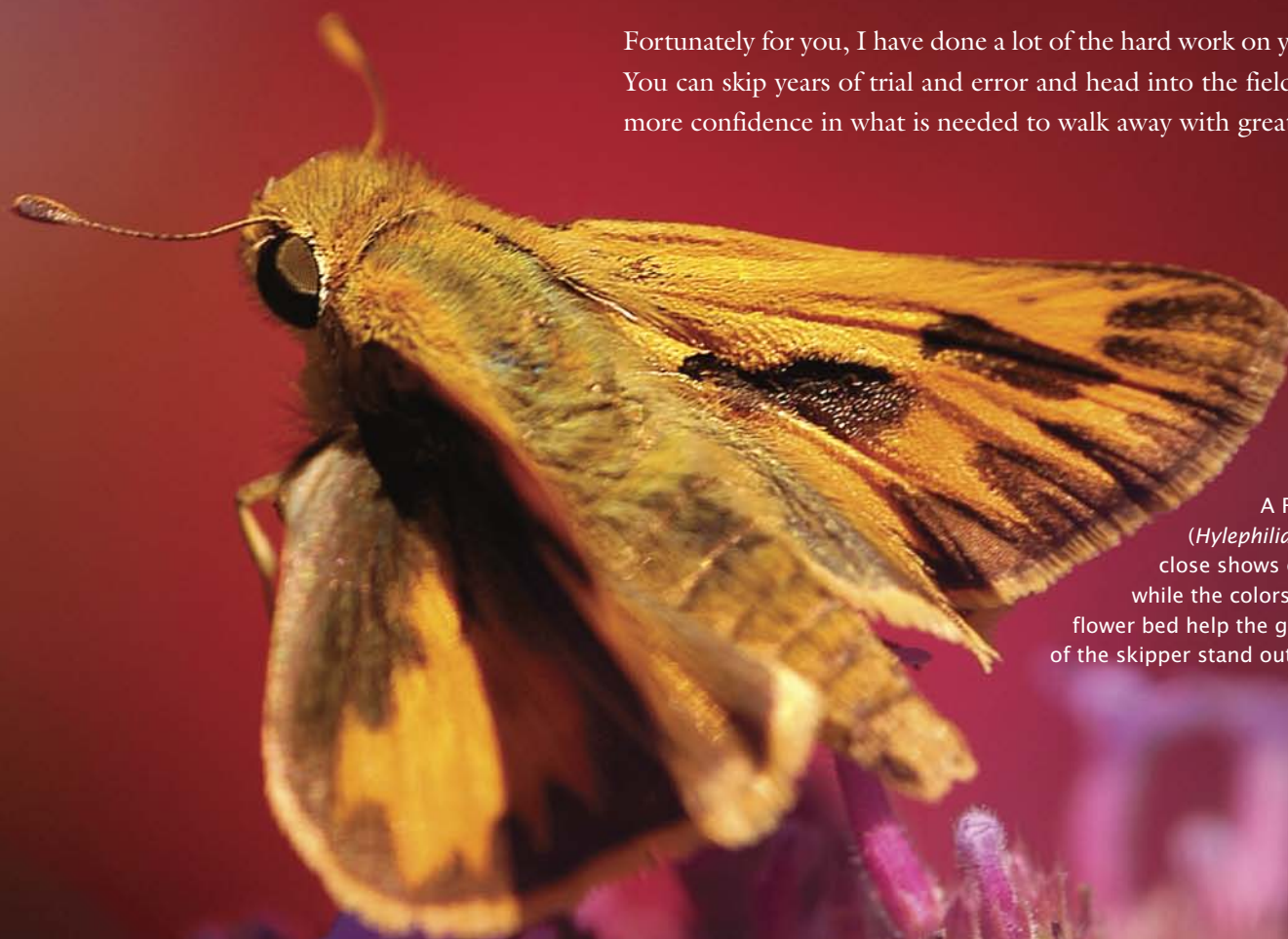
PART TWO

# PHOTOGRAPHING BUTTERFLIES

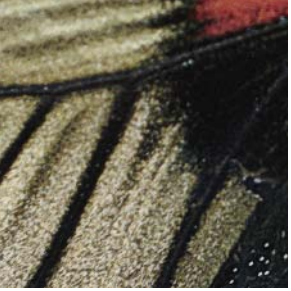
Taking stunning photographs of butterflies involves knowledge of the butterfly and its behavior, technical knowledge of photography, good camera equipment, lots of practice, and a certain element of luck. Thought to have derived from Benjamin's Franklin's quip, "Diligence is the mother of good luck," there's a quote attributed to Samuel Goldwyn that sums it up:

"The harder I work, the luckier I get."

Fortunately for you, I have done a lot of the hard work on your behalf. You can skip years of trial and error and head into the field with a lot more confidence in what is needed to walk away with great images.



LEFT—  
A Fiery Skipper  
(*Hylephilia phyleus*) up  
close shows great details  
while the colors of a distant  
flower bed help the golden colors  
of the skipper stand out even more.



## 6. Digital Cameras and Lenses

The digital camera has evolved so dramatically in recent years that even inexperienced amateurs using entry-level consumer cameras are able to take remarkably good photographs with cameras taken right out of the box. The future holds promise of even greater

technological advances, which are guaranteed to produce even more incredible photographs.

### Digital Cameras

The single greatest feature of the digital camera is its ability to immediately generate an image. Gone are the days when you spent the day in the field, dropped your film off at the lab, and picked up your prints or slides a week or so later. If your settings turned out to have been off, you were simply out of luck—and until you picked up those images, you had no idea. Today, your camera will instantly show you if you nailed your shot or missed it. If you missed, you can make quick adjustments and try it again. You'll even be able to see a histogram of your shot that will allow you to fine-tune your settings in seconds. What an extraordinary difference these past few years have brought. I can hardly wait for the future!

I can already see major differences in the progress of the students in my current classes versus those of several years ago. Before the digital age, my classes were fairly academic. We reviewed the steps necessary to take good pictures in a classroom environment, then went out into the field to take photos. I could show them what to do, but I (and they) had no idea if the results were good, bad, or indifferent. Most would find out one or two weeks later—far too late for me to help correct their mistakes. Today, we still have the

The single greatest feature of the digital camera is its ability to immediately generate an image.



same classes, but the students immediately know if they are doing things properly. The “eureka” factor now works for students. They see the results and know they can do it! That’s extremely important for any new photographer. I frequently receive e-mails with attachments by proud beginners who took a really great shot earlier that day. It’s extremely rewarding.

Depending on the camera you own, you will have the ability to choose from a wide array of useful tools. In this chapter, we’ll look at some of the features of the DSLR (digital single lens reflex) camera. Even if you don’t own a DSLR camera, you’ll probably find that your camera offers some of the same options and settings. (*Note:* Because I use Nikon equipment, many of the terms used will be those associated with Nikon cameras. Refer to your owner’s manual for specifics about your camera.)

### Focusing

Most cameras allow users to choose from a variety of settings to assist in achieving sharp focus.

**Focus Mode.** DSLR owners have three options to control how the camera focuses.

A Pearl Crescent (*Phyciodes tharos*) enjoys a visit to some fresh flowers.





*Manual Focus.* In this mode, you must manually focus the camera. Photographs can then be taken whether or not the subject is in focus. See pages 104–5 for more on using camera position to fine-tune your image when using manual focus.

*Single Focus.* When set to the single-focus mode, the camera will automatically focus once and lock it. If the camera cannot find a point in the frame that is in focus (you are too close, for example) it won't fire. If a butterfly is resting or moving slowly, I often use this mode, because I know that my focus will be sharp; if the butterfly is not in focus, the camera will not allow me to take the picture. This gives me a higher percentage of “keeper” images.

*Continuous Focus.* In this mode, the camera will automatically focus when the shutter release is depressed halfway and will continue to seek points of focus until the shutter release is fully depressed. Photographs can be taken whether or not the subject is in focus. Because the camera will snap a picture whether



This image of an American Lady (*Vanessa virginiensis*) demonstrates the use of lines, color (purple against orange), and subject placement according to the rule of thirds.



A Chinese Yellow Swallowtail (*Papilio Xuthus*) has only two small dots of yellow on its wings.

the subject is in focus or not, you will have more images to delete than when using the single focus mode.

**Autofocus Settings.** When using the autofocus, several modes are available.

*Single Point.* In this mode, which Nikon calls single-area AF, the camera will automatically focus on whatever is in the center of the small box you see in your view screen. This is the setting that I normally work with, because I want the camera to remain focused on the eye of the butterfly as it moves around the surface of a flower.

*Multiple Points.* This setting, which Nikon calls dynamic-area AF, usually allows the user to manually focus on one spot and, if the subject moves, have the camera automatically focus on the new position. Using this to focus on a moving butterfly usually doesn't meet my requirements, and so I don't use it.

*Groups.* This setting, which Nikon calls the group-dynamic AF, is best used for taking photographs of people or large groupings of slower moving objects. It will focus the camera in the center of a group and shift focus whenever someone moves. This feature hasn't been effective in my butterfly photography.

*Closest Subject.* This feature, which Nikon calls dynamic-area AF with closest subject priority, instructs the camera to focus on whatever is closest to the



camera. Because it is designed to automatically focus on erratically moving subjects, this mode is good for photographing butterflies in flight. This selection, however, fails to work as expected in many butterfly-photography situations, because the closest subject is actually the flower petal facing the camera or the branch that's between you and the butterfly.

**Focus Area Selection.** Digital camera users can also identify where they want their cameras to focus: the center, top, bottom, left, or right sides of the frame. Advanced systems allow for a few extra places in the frame. This is important if you want to be creative in your photography—after all, you might want the subject to be on the right side of the screen with something interesting in the background on the left side of the photograph. I am constantly shifting from one position to another as I change from a horizontal shot to a vertical shot and compose the image using the rule of thirds (see page 96), so this is a good feature. You can use this setting in either the single or continuous focus mode by pressing the shutter release halfway down and waiting for the focus indicator to come on in the viewfinder. When it does, you can move the indicator to the right, left, up, or down—wherever you want the focus to be—before pressing the shutter release all the way down to take the picture.

Notice the change in focus in these otherwise very similar images. In the photo on the left, the head is in focus. In the photo on the right, the tail is in focus. This is a Lacewing (*Cethusia cyane*) from India.

I am constantly shifting from one position to another as I change from a horizontal shot to a vertical shot.

## Exposure

**Exposure Modes.** Many cameras (both film and digital) allow users to select one of four methods that will determine how the camera will set shutter speeds and aperture settings for the best exposure.

*Automatic.* Most beginners use the automatic mode as their default setting. In most circumstances, this setting provides near perfect results. Consequently,



it's the setting I usually recommend for beginners (those with less than a year of experience). The downside to the Automatic mode is that the camera makes all the decisions, and it is programmed to use the fastest shutter speed and sharpest aperture setting possible, which is not always ideal. As noted in chapter 8, large apertures are often desirable for blurring the background. Similarly, fast shutter speeds are often needed to freeze subjects in motion. Obviously, the camera can't see the subject, so it can't make these decisions.

*Program.* To compensate for this, many cameras offer a Program mode. This is *almost* automatic (the camera makes many of the exposure decisions for you), but it allows the photographer to adjust the shutter speed or aperture settings to achieve the desired results. Nikon uses the term “flexible program” to de-



This Gray Hairstreak (*Strymon melinus*) was photographed against a marigold. The combination of a high shutter speed ( $1/1000$  second) and a moderate aperture setting (f/8) helped blur the background.

scribe how this works. These new settings will remain in place until you turn the camera off or back to the original setting.

*Shutter Priority.* I find that the Shutter Priority mode works best when photographing butterflies. Because butterflies move quickly, a fast shutter speed is usually required to freeze them in the frame. In this mode, you can set that fast shutter speed, say  $\frac{1}{250}$  second or  $\frac{1}{500}$  second, and let the camera automatically set the aperture for you as you move from one lighting condition to another. It also allows you to completely blur the backgrounds if you want; a simple shift of the command dial and you're shooting at  $\frac{1}{1000}$  second—still freezing the motion of the butterfly but forcing the camera to select a wider, background-blurring aperture to compensate for the faster shutter speed.



A few years ago, this Orange Sulphur (*Colias eurytheme*) was selected by FujiFilm to decorate their pavilion at a large annual photography show held in New York City.

This can be especially useful if the butterfly is not parallel to you and your camera . . .

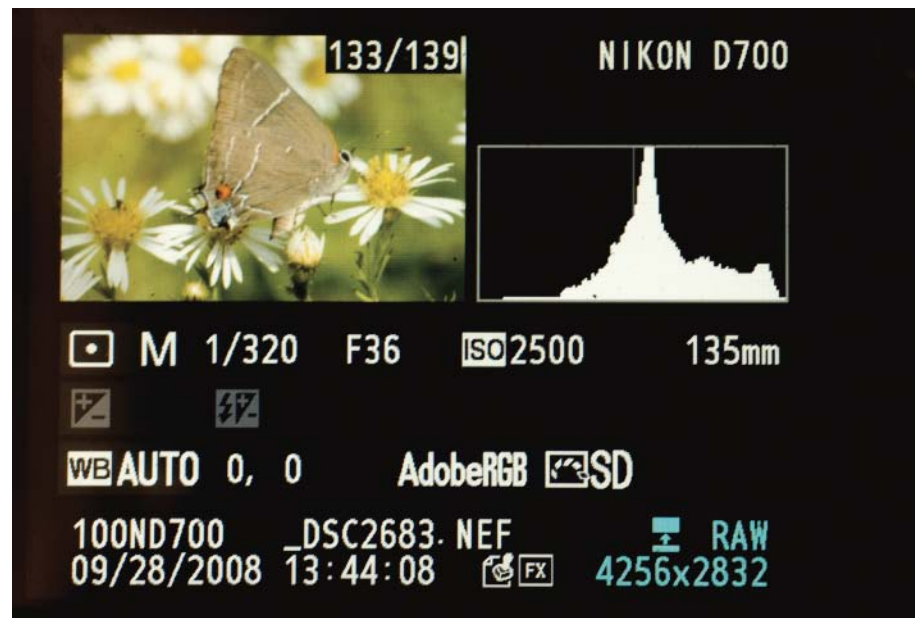
*Aperture Priority.* This setting is useful if you want to create a series of shots where the background is blurred. Simply set the camera to Aperture Priority and select a value of  $f/2$  or  $f/4$ . All the images you take using that setting will produce blurred backgrounds. The other reason for using this mode is to take advantage of the “sweet spot” where the image is the sharpest for the lens you are using. You might want to set all your photos to be taken at  $f/8$  or  $f/11$  because you will get overall sharper images using that aperture setting. The last use of Aperture Priority is to produce images with the greatest possible depth of field. If the butterfly is resting (and you won’t need higher shutter speeds to freeze action), you may decide to shoot at  $f/16$ ,  $f/22$ , or even  $f/32$  for maximum depth of field. This can be especially useful if the butterfly is not parallel to you and your camera (see page 95). The greater the angle, the smaller the aperture you will want to use.

*Manual Mode.* In this mode, you make all the exposure decisions yourself, giving you the greatest possible level of control over your images. The key, however, is to adjust your settings whenever the lighting changes. If the sun ducks under the clouds or if you move into a shaded area, you have to adjust your aperture and/or shutter speed settings.

**Exposure Evaluation and Compensation.** One of the most exciting innovations in photography is the ability to see a histogram of the image you have just photographed. Once you’ve mastered the art of reading histograms, you can instantly tell if you need to add or remove a little light.

A histogram is basically a graphic representation of all the tones in an image, from pure black to pure white. In most cases, the histogram should look like a bell. If the bell’s right side falls short of the highlight edge of the graph (it ends closer to the center than exactly at the edge), you may need to add a little light.

Ideally, a histogram should appear like a bell. In reality, however, the images typically look like mountain peaks, depending on what is being photographed.





If the bell's left side comes up a little short of the shadow end of the graph, you may need to subtract a little light. That's it in a nutshell. (*Note:* This is a generalization that applies to most scenes. If your overall scene is very dark or very light, or contains large areas that are very dark or very light, your histogram may look quite different and be shifted to the left or right of center. This does not mean your exposure is wrong.)

You can make these adjustments using the methods I've described above or you can use the exposure-compensation feature that many cameras include. With this, you can instantly add to or subtract from your exposure in small increments. (Just be sure to return the exposure-compensation settings back to zero when you are done.)

### ISO Settings

Films and digital camera sensors are sensitive to light just like our eyes are sensitive to light. How sensitive they are is described using an ISO number. This is named after the International Standards Organization, which established universal standards for the sensitivity of film. These same ISO ratings are now applied to digital cameras.

Summer Azures (*Celastrina argiolus*) are tiny, white butterflies seen from April to November in Northern Virginia.





The Sachem (*Atalopedes campestris*) is the most common skipper seen at Meadowlark Botanical Gardens. When conditions are right, they appear by the thousands.

To minimize noise, use the lowest ISO setting possible given the available light levels.

With film, each roll had its own unique ISO; if you wanted to switch to a different ISO, you had to switch to a different roll of film. With digital cameras, a simple button push or two will allow you to make the same adjustment—and you can change the ISO setting from frame to frame, if you so desire.

But which ISO setting should you choose? Higher ISO ratings mean much greater sensitivity (i.e. less light is required to make the image), but this comes at a price: the higher the ISO, the greater the chance that your digital image will be “noisy” (have a grainy appearance). This look like “salt and pepper” pixels randomly scattered throughout some or all of an image. Lower ISO settings eliminate this problem, but require more light to make a image.

**Low ISO Settings.** Low ISO settings (ISO 25, 50, or 100) work very well in bright daylight, but not as well in dark areas, such as churches. Low ISOs are also known as “slow” (because longer shutter speeds are typically required when working with them) and are characterized by a very minimal appearance of grain/noise. Many, but not all, digital cameras have the ability to work using an ISO 100 or lower setting.

**Moderate ISO Settings.** ISO settings of 200 to 500 produce very fine results with minimal grain or noise. the point at which noise will become objectionable varies widely from camera to camera, so you may need to experiment to determine the highest ISO setting you can you to produce acceptable results.

To minimize noise, use the lowest ISO setting possible given the available light levels. Here’s a rule of thumb: in Shutter Priority mode set the shutter speed to  $\frac{1}{250}$  second, then increase the ISO setting until the aperture rises to approximately f/8 under the specific lighting you are under.

**High ISO Settings.** Very high ISO settings (ISO 1000 and above) are also known as “fast” (because very short shutter speeds are typically needed when working with them) and are characterized by a very minimal appearance of grain/noise. These settings are rarely necessary for outdoor butterfly photography, because there is almost always plenty of light available. These high settings do, however, make it possible to use very high aperture settings (f/22) in combination with fast shutter speeds—but you usually don’t require that much light to get a good exposure.

It should be noted that noise is becoming less of a factor as newer technologies emerge. I recently purchased the Nikon D300 and D700, which allow me to use higher ISO numbers without the typical noise problem, so I plan to experiment with these settings. I want to see if I can stop motion without the use of flash—or possibly in combination with flash set at its lowest power settings to obtain a very short burst of light.

### Image Files

When setting up your camera, you will also need to make a few decisions about the setup of the image files you will be creating.



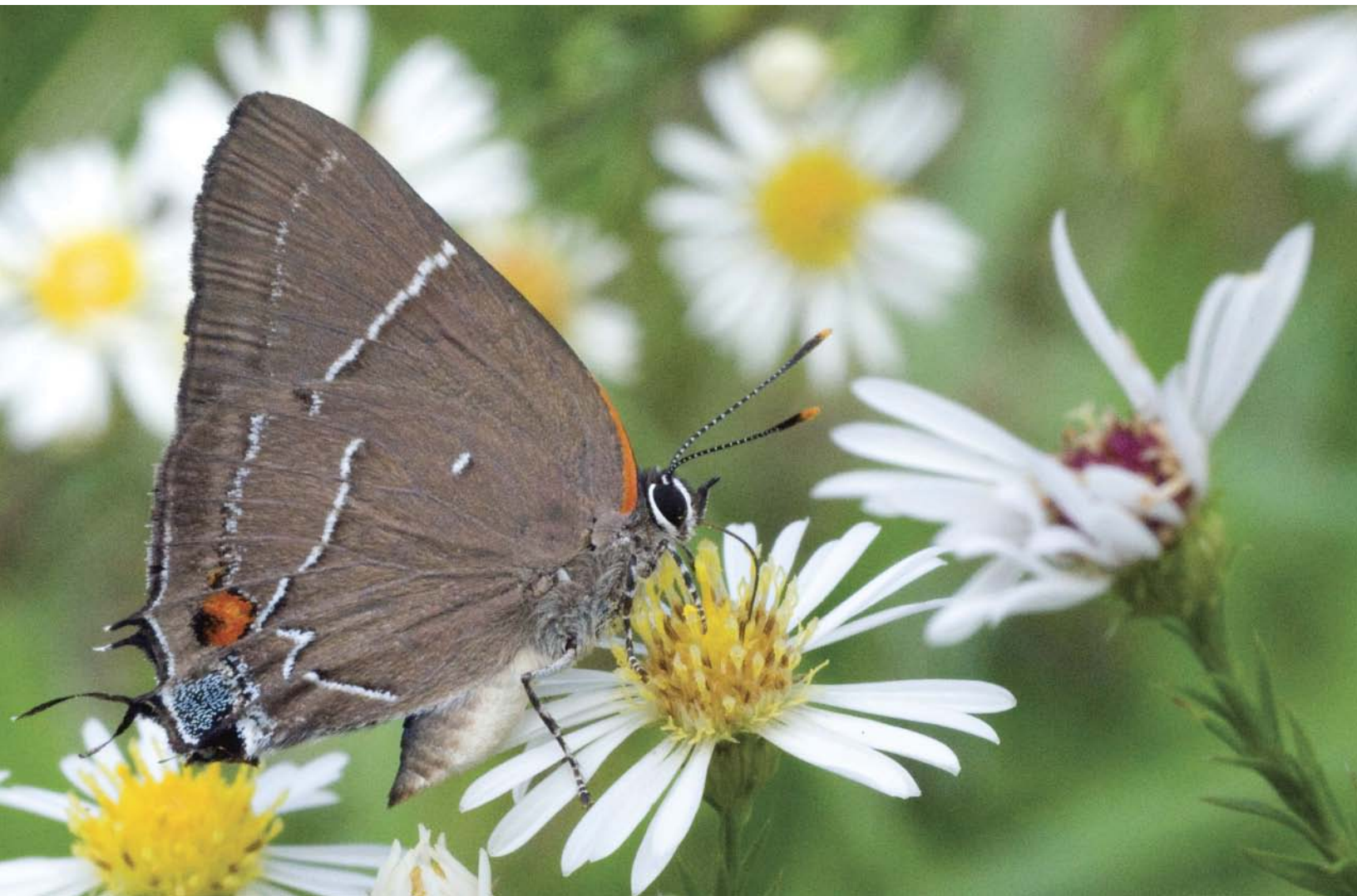
**File Formats.** The first decision you will need to make is the file format. The choices you have will vary depending on the camera you are using, but RAW and JPEG are the two most popular selections.

*RAW Files.* For serious nature photographers, the RAW file setting offers several useful advantages. These files contain every last piece of the information recorded by the camera—nothing is eliminated. This gives you the most flexibility after the shoot to adjust the exposure, white balance (see pages 80–82), color, and more. One drawback of this is that it produces a pretty big image file, so you'll need plenty of space on your memory cards. Also, you'll also need a specialized software program, such as CaptureOne Pro or Adobe Camera Raw, to adjust the file before it is converted to a TIF or JPEG for further editing, printing, or sharing on-line. (*Note:* The option to shoot RAW files is usually found on higher-end cameras, but it is making its way to lower-end cameras, as well.)

*JPEG Files.* JPEG is a file format that has become almost universal. It is created by virtually all cameras, accepted by most imaging and word-processing applications, and used widely on the Internet. Because these files are compressed (i.e., some of the data is discarded), their file sizes are much smaller. This means that more of them will fit on a given memory card. However, because JPEG files contain less data than what was actually captured by the camera, your ability to correct errors in postproduction is more limited than with

The choices you have  
will vary depending on the  
camera you are using.

The White M Hairstreak (*Parrhasius m-album*) was spotted at Meadowlark Botanical Gardens—I searched for this elusive butterfly for several months! It is the fifty-fifth butterfly species seen and photographed at the gardens.





### ***What's Your Problem?***

One problem that has plagued photographers since digital cameras first came out is a delay between when you pressed the shutter release and when the camera actually took the picture. This is called lag time—and it can get frustrating! You try to snap a great picture of a butterfly sitting on a flower . . . but by the time the camera takes the picture, your subject has flown away! Fortunately, manufacturers have worked to resolve that issue and it is no longer a problem with more advanced cameras. It remains a hindrance, however, for those working with many basic models. So, if you are having problems with lag time, it may be time to look into getting a newer camera.

Another problem can be the time it takes for the camera to download the file to the memory card after the picture has been taken. When shooting in the continuous mode (where the you hold down the shutter button and the camera shoots frame after frame) the camera can quickly get backed up. This is not a problem for most beginners, and it's not usually a problem when the files are small (like a JPEGs). It does become an issue if the files are large, though (like RAW files in the 10-gigabyte range)!

RAW files. Therefore, you need to be especially precise when determining your exposure settings.

How much data will be discarded when a JPEG is compressed is determined by selecting the image quality. This ranges from Low or Basic (high compression is used; a lot of data is discarded); to Medium or Normal (moderate compression is used; some data is discarded); to High or Fine (less compression is used; less data is discarded). If you decide to shoot JPEG images, I recommend you choose the High setting. The file sizes produced will be very manageable and you'll retain the most possible data—meaning your images won't suffer visually from being compressed.

The file sizes produced will be very manageable and you'll retain the most possible data.

*JPEG + RAW.* Some systems allow you to have the best of both worlds, saving the same image simultaneously as a RAW and a JPEG image. This takes up even more space on your memory card, but it can help you go home with more “keepers” (or “almost keepers” that can be tweaked in their RAW versions to create exactly what you wanted).

*TIFF.* Some cameras offer you the ability to shoot TIFF (Tagged Image File Format) files. This produces very large files, but also extremely high image quality. Unlike RAW files, TIFF files can also be opened by most image-editing programs.

**Image Size.** On some cameras, you can also choose the image size (the total number of pixels in an image). This will determine the largest print you can make from the image file. These settings vary from camera to camera, so check your owner's manual. To be safe, you may always want to shoot the largest

image possible. It's easy to crop a big image to a smaller size in post-production. Smaller images cannot, however, be made much larger without a significant loss of quality.

### White Balance

This setting will need to be adjusted based on the lighting in the scene you are shooting. Therefore, it is covered in detail in chapter 7.

### Lenses

DSLR cameras work with an astonishing variety of lenses. Many are older lenses, manufactured by the camera's maker, that still work today. Others are newer adaptations that address some of the unique characteristics of digital camera sensors and reflect the latest in lens technology (like vibration reduction/image stabilization). The introduction of very high-quality zoom lenses has also given photographers first-rate lenses with enormous range and versatility—you can go from ultrawide angle to moderate telephoto, and from moderate telephoto to extreme telephoto with just one or two lenses!

**Focal Length Factors.** The effective focal length of a lens (how wide or close a view it produces) is calculated based on the size of the frame on which the image is recorded. Because the image sensors in digital cameras are, for the most part, smaller than the size of a 35mm film frame, this means that the angle of view achieved using a given lens will be smaller than when the same lens is used on a 35mm camera. For many people this will make no difference; if you are an experienced film photographer, however, it can mean that your old familiar lenses start producing very different effects when you use them on your new digital SLR.



A Red-Banded Hairstreak (*Calycopis cecrops*) rests on a blade of grass.

The focal length factor is the value by which the focal length of a 35mm lens is multiplied to determine its effective focal length (also called the “35mm equivalent”) on a digital camera. This varies from camera to camera, but is usually around 1.5. Here are some examples based on that conversion factor:

- a 20mm film lens = a 30mm digital lens
- a 50mm film lens = a 75mm digital lens
- a 100mm film lens = a 158mm digital lens
- a 200mm film lens = a 300mm digital lens
- a 400mm film lens = a 600mm digital lens

This is a good news/bad news situation for those converting to digital. Photographers who once owned a 400mm telephoto lens will suddenly have a much more powerful 600mm telephoto lens. Unfortunately, their old 20mm wide-angle lens will now be a much less impressive 30mm wide-angle lens.

For butterfly photographers this can be really good news. A 200mm film-camera lens, when mounted on your digital camera, will take photographs that previously required a 300mm lens to capture. This is a heck of a jump at absolutely no cost to the owner of a new digital camera.

**The Best Choices for Butterfly Photography.** For many years, my favorite film-camera lens was the Nikon 80–200mm zoom telephoto. I used it with an extender (more about extenders in a moment) and sometimes with a multiplier (more about multipliers shortly, too). The camera produced amazing images over many years. I finally retired it when I purchased my first autofocus Nikon F100 film camera and converted over to newer, autofocus lenses.

I can zoom out with a quick twist and never have to remove my eye from the action.

My second lens, purchased for use with a Nikon D100 camera was the Nikon 70–180mm macro telephoto. That “macro telephoto” designation means that the lens will focus in very closely from a distance and will allow me to photograph butterflies well outside of their fright or flight zone. The lens is very, very sharp and it has been a constant tool in my camera bag. (*Note:* With it, I frequently use a powerful magnifying filter, called a Nikon T-6, to allow me to move in even closer.)

I purchased a fixed 200mm macro zoom lens when I purchased my first D200 camera and it, too, is very sharp and produces excellent results. However, I recently sold it because I found it difficult to work with the fixed focal length. If a butterfly moved closer to me, I would have to back up suddenly—and that altered my stance, interrupted my concentration, and caused me to refocus. With my 70–180mm, I can zoom out with a quick twist and never have to remove my eye from the action.

There are numerous macro, micro, and “close-up” lenses in the 55mm or 105mm class. These offer outstanding close-up photographs. However, they don’t work that well with butterfly photography, because you need to move in



close to the subject to focus—something butterflies don't like. Although they take great pictures, they disturb the butterfly.

### Lens Accessories

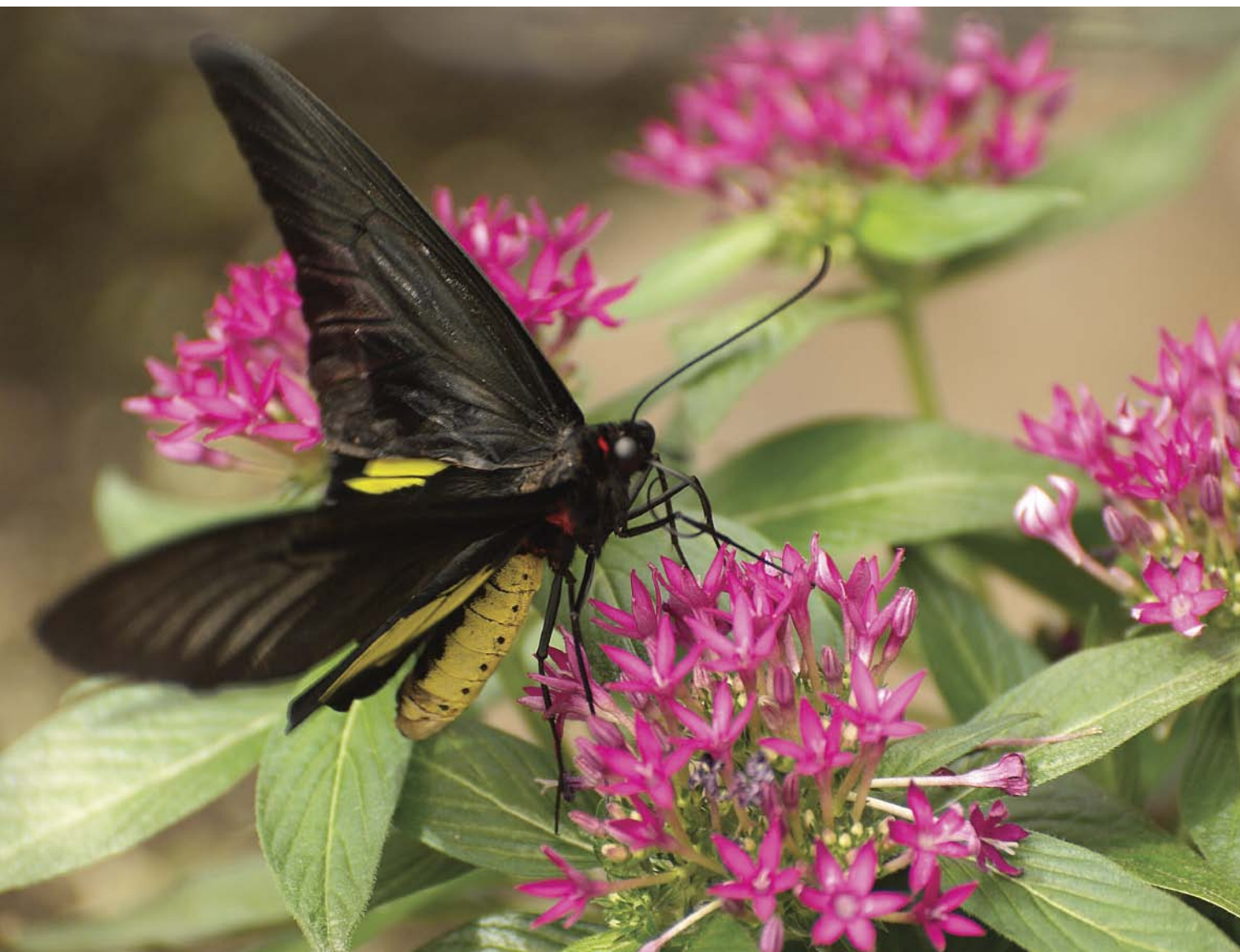
**Multipliers.** Multipliers, also called doublers, are attachments that you mount to your camera before you add on the lens. These are used to increase the magnification of your lens in set increments (for example, a typical multiplier can increase the power of a 200mm lens to that of a 400mm lens). There are a few drawbacks to using a multiplier. First, you will lose one stop of light (meaning longer exposures or wider apertures may be needed). Your view screen may also grow dark when shooting at smaller aperture settings. Additionally, depending on the model camera you own, the electronics necessary for exposure metering might not work. To avoid some of these issues, it is generally best to use a multiplier built by the manufacturer of your camera.

**Close-Up Lenses (or Filters).** You can also purchase a series of glass elements that you screw directly onto the front of the lens (like a filter). These allows you to focus on your subject from very close distances. They usually come in a set but can also be purchased individually. I recommend a +5 diopter lens or higher. This allows you to get about 8 inches from the butterfly. There is no significant penalty to pay in terms of aperture settings or shutter speeds and dis-

### Helpful Hint

If you remove the sunshade from your lens you will be able to move an inch or two closer to your subject—sometimes these tiny distances add up! Yes, you may have problems with lens flare, but getting in close can sometimes produce really interesting photographs.

The Common Birdwing (*Troides helena*) is an Asian butterfly.





A Peck's Skipper (*Polites peckius*) poses nicely for its photo. If you use a combination of extenders and multipliers on a macro zoom telephoto, you can really get in tight. However, depth of field becomes a serious challenge because you are working so close. You'll need all of the aperture power you can get and then some! Still, the results can be awesome.

tortion is minimal. Unfortunately, your autofocus probably won't work if you get too close or too far away. The best idea is to use manual focus and gradually adjust your camera position until the subject is in focus.

**Extension Tubes.** Extension tubes, also called extenders, are used between the camera body and the lens. These offer a very useful way to get a closer view while still maintaining a respectable working distance from your high-strung subject. Because extenders do not contain lenses, they are open spacing tubes, they are also relatively inexpensive. By altering the distance from the lens to the camera, they allow you to focus much closer than normal. (*Note:* With an extender in place, however, you can't simply look up and use your telephoto lens to take shots of the hawk you spotted on a distant tree limb. You'll have to remove the extender before you resume photographing with your telephoto.)

The two problems I have had with extenders was that older models did not provide the information necessary for automatic focusing (there were no electronic pathways between the camera and the lens). You can now buy extenders that are fully compatible with your camera's lens system, but they are expensive. The other drawback is that the extender, like the multiplier, causes you to lose an f-stop of light.



## 7. Lighting and Exposure

When teaching butterfly photography in years past, I used to spend an great deal of time on exposure, bracketing, and how to evaluate the light on a subject. Today's cameras are so much better, however, that these concerns are largely secondary for today's

butterfly photographer. However, some discussion of photographic lighting is still in order.

### White Balance

Photographers who use film (yes, they are still out there) know that different films will give them different colors. Fuji Velvia, one of my favorites, did wonderful work with greens. Ektachrome films usually produced gorgeous blues. Kodak's Portra films recorded flesh tones beautifully. Sometimes, however, scenes might be too blue and you had to add a warming filter over your lens to reduce the cool feeling of the blue hues. Sometimes you needed to reduce the too-warm red and yellow tones in an image, so you added a cooling filter. There were also special films for shooting under tungsten lighting and special filters for use under fluorescent lights.

Humans have a marvelous capability to interpret (see) white as white—a white flower, for instance, looks white whether we see it in bright sun or deep shade, under tungsten or fluorescent lighting. When we first walk into a room light by candles from a bright, sunny day we notice the golden glow for a few moments, but our eyes soon adjust and things look “normal” again. So we do know that there is a difference.

Cameras (whether film or digital) can't make that distinction; they are totally objective and record exactly what they see (*i.e.*, in the bluish light of deep shade,

A white flower, for instance,  
looks white whether we see it  
in bright sun or deep shade.





A Great Spangled Fritillary (*Speyeria cybele*) feeds in the Shenandoah National Park next to a scenic overlook.

it will produce a beautiful image. No further adjustments are needed. I am amazed at how good the results are using the Automatic settings on even the most basic cameras on the market!

*Sunlight.* On many cameras, there is a white-balance designed specifically to produce accurate colors when shooting in bright sunlight. So if you're shooting in bright sun, you'll achieve better accuracy in your images if you work with the Sunlight white-balance setting.

*Flash.* If you are going to be taking lots of photographs indoors using your flash, it makes sense to let the camera know that you will be using your flash by selecting the Flash white-balance setting. You can also choose a Flash setting when using a flash outdoors as fill light on a sunny or partly cloudy day. Again, the odds of a better color rendition improve if you (not the camera) determine the settings.

*Cloudy.* When cloudy conditions prevail, the light will have a slightly blue cast that can be resolved using the Cloudy white-balance setting. Many nature photographers like the added warmth that the Cloudy setting offers. In fact, if the sun is popping in and out as clouds drift past overhead, the Cloudy setting can work under both conditions.

*Shadows.* Sooner or later, you'll want to photograph a butterfly in the shade, where the light has a blue cast. If you select the Shadow white-balance setting, the camera will compensate for the shift toward the blue end of the color scale, producing an image that is closer to how your eyes saw the subject.

**Indoors.** If you have occasion to photograph butterflies indoors without flash (or some other daylight-balanced light source), the following white-balance settings will come into play.

a white flower will record as pale blue). To compensate for this, today's digital cameras are equipped with a variety of white-balance settings. These allow the camera, like your eyes, to see white as white in a variety of lighting situations.

**Outdoors.** Your digital camera offers several white balance settings, but only the Automatic, Sunlight, Flash, Cloudy, and Shade settings are necessary for photographers looking to photograph butterflies outdoors.

*Automatic.* If you leave the white-balance setting on Automatic, the camera will make all of the adjustments it is programmed to make—and 95 percent of the time (or more),

*Tungsten or Incandescent.* When photographing indoors without flash and with normal (not fluorescent) lights, select the Tungsten or Incandescent white-balance setting. This will compensate for the orange color cast of this lighting and produce beautiful, neutral whites.

*Fluorescent.* Fluorescent lighting was once the most dreaded lighting condition for professional photography, but now takes just a moment to resolve: change the white-balance setting to Fluorescent. Instead of the ghastly greens normally created by this type of lighting, you'll get perfect whites! (*Note:* Of course, this is not usually a problem for butterfly photographers.)

In all types of lighting, you can expect your digital camera to do a commendable job. However, if you know you are heading for a butterfly resting under a tree, why not switch to the Shade setting? It will produce a better image that won't need any tweaking in Photoshop. (*Note:* If you are shooting RAW files, rather than .JPEG, you can even adjust the the white balance in postproduction.)

### Exposure Metering

Today's digital (and film) cameras provide near-perfect results in their Program or Automatic modes. Many digital single lens reflex (DSLR) cameras offer users several methods to meter the scene, including:

**Multi-Pattern Metering.** Although different camera manufacturers use different terms to describe it (Nikon calls this mode matrix metering, for example), multi-pattern metering causes the camera to measure all of the light coming from a subject and, using factory-installed algorithms, calculate the optimal settings for that specific scene. This works very, very well for almost all situations. It begins to falter, however, when the main subject is very bright or dark. This can trick the meter into thinking the subject needs more or less exposure that it actually does, resulting in an under- or over-exposed picture.

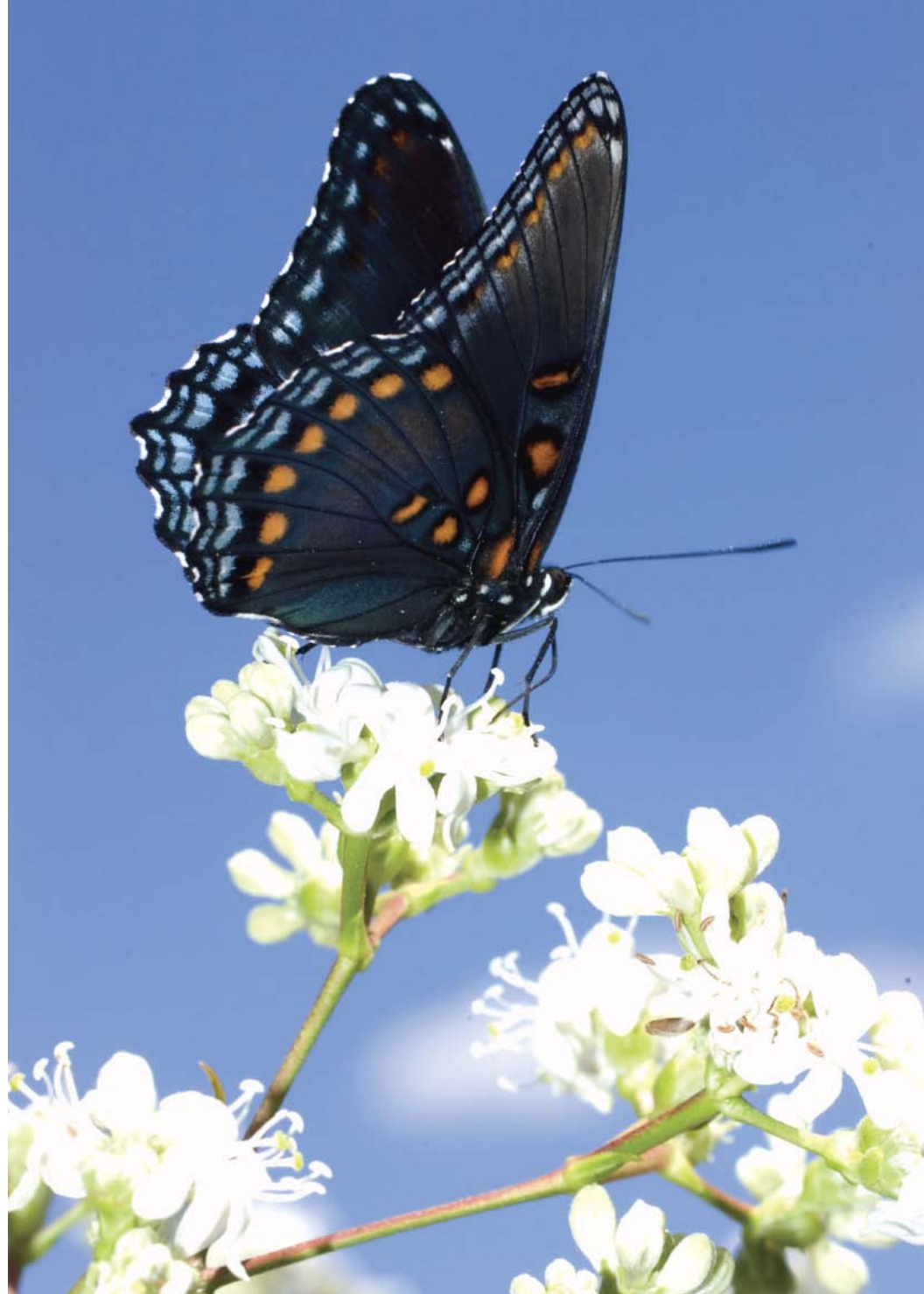
**Center-Weighted Metering.** The camera gives priority to a smaller area in the center of the image while assigning less weight to areas of light or dark along the outer edges. This feature is helpful when focusing on the faces of a

This can trick the meter into thinking the subject needs more or less exposure that it actually does . . .



This Great Spangled Fritillary (*Speyeria cybele*) was photographed in the Blue Ridge Mountains of Virginia.

This photograph of a Red-Spotted Purple (*Limenitis arthemis*) had a bright blue sky with white clouds behind it, and it was sitting on white flowers, *and* I was using a flash. Normally, the rich blue colors of this butterfly would have been blown out. Because I used the spot meter, though, the camera knew exactly what I wanted exposed and it did a great job.



bride and groom (one wearing a dazzling white dress and the other a dark tuxedo), but it also applies to butterfly photography. By weighting the exposure toward the center of the frame, which is often filled with the butterfly, this metering mode can provide more accurate exposures.

**Spot Metering.** In this mode, the camera obtains its exposure information from a small, single spot. This is helpful if you are photographing a small, white butterfly surrounded by dark green leaves. The subject is the butterfly and that's what you want highlighted—not the leaves. Spot metering can also help when you are photographing a dark butterfly sitting on a white flower. Again,



the subject is the dark butterfly and not the white petals. Spot metering is a very useful tool that can really help produce more accurate images.

## Bracketing

Bracketing means taking a sequence of shots at slightly different exposure settings. Why would you want to do this? Well, imagine you are photographing a brilliant yellow Sulphur on a bright day. This could trick your camera into underexposing the image. If, however, you took this shot at a few exposure settings (some over what the camera recommended and some under), chances are at least one of them would be right. This is a fairly common tactic for many outdoor photographers.

Many cameras can be programmed to automatically bracket each shot by a set amount—up to as much as three stops up or down. You simply push the shutter and a sequence of images (at varying exposures) will be created according to the program you’ve chosen.

If that is not enough, or if you’d prefer not to program that feature into your camera’s operating system, you can also manually adjust the camera’s setting by adjusting the exposure compensation feature (usually denoted by a “+/-” icon). This lets you quickly control the exposure value. Just remember to return the exposure compensation setting back to zero when you are finished.

## Working with Natural Light

In addition to using the proper white-balance setting for the given lighting condition, you should be aware of the advantages and occasional pitfalls of the various types of light you will encounter in the field.

**Full Sunlight.** Full sunlight produces dazzling colors and is obviously the choice to work with. The main drawback is that there may be areas of dark

Many cameras can be programmed to automatically bracket each shot by a set amount.

Bracketing means taking a sequence of shots at slightly different exposure settings in order to ensure you’ll go home with at least one that is perfectly exposed. Here, we see an Autumn Leaf (*Poleschalia bisaltide*).





The Postman (*Heliconius melpomene*), a tropical butterfly, was photographed in full sun. Full, top-down sunlight produces brilliant colors and gives you ample room to experiment with different settings. This image was taken at  $\frac{1}{160}$  second at f/7.1. This produced the image I wanted at a very slow ISO.

shadows that can produce too much contrast or hide some of the beauty of the butterfly. Despite the problem with shadows, full sunlight is the best light for taking pictures of butterflies.

There are hundreds of different ways that full-sun will fall on your subject. Most photographers work under one of the following conditions:

*Top Lighting.* Most images are taken during the daylight hours when the sun is overhead. This is the normal light used for almost all butterfly photography. When working under top-down lighting, the flower frequently will serve as a reflector, pushing light back up and illuminating the butterfly's underside.

*Front Lighting.* Front lighting on the butterfly occurs when the sun is at your back, when you use on-camera flash, or if you bounce from a reflector held facing the butterfly. The only cautionary note is to make sure that your own shadow, or that of your camera and/or flash housing, doesn't fall on the butterfly. That is likely to cause it to fly away.

*Side Lighting.* Side lighting on the subject occurs when the sun is near the horizon, either rising or setting. This is a great source of light and one that ad-



This Red Admiral (*Vanessa atalanta*) was photographed with the sunlight coming in from the behind the subject (backlighting). The front of the butterfly is almost dark, but the brilliance of the orange stripes helps make this a successful photograph.

vanced photographers seek out for their images as it brings out the texture in the wings and adds a golden hue to the butterfly.

**Backlighting.** Backlighting can present the butterfly in an unusual way. This is especially effective when the butterfly has spots that permit light to pass through the wings. It also produces a nice rim-lighting effect (highlighting along the edges of the subject).

**Bottom Lighting.** Light shining upward to illuminate a subject is not common, but it can produce interesting results. Sometimes this occurs when the light of the sun is bounced up and illuminates the underside of the butterfly.

**Cloudy Day Light.** Clouds drifting in front of the sun are a natural phenomena and one that you can use to enhance your photography. Clouds act as a giant diffuser that help scatter the sun's rays and produce a gentler image. Heavy shadows melt away leaving you with a very beautiful picture.

The downside to clouds are as follows. First, you will have to reduce your shutter speed or open up your aperture (go from f/8 to f/5.6) to compensate for the lower levels of light. Second, the cloudy sky might introduce a mild color cast, but that is not a problem if you can adjust your white-balance settings. There are times when clouds are passing by so quickly that it's best to put your white-balance setting on Automatic and leave your camera in the Automatic or Program mode. This allows your camera to

Light shining upward to illuminate a subject is not common, but it can produce interesting results.



adjust the exposure and white balance from moment to moment as the lighting conditions change.

Butterflies also fly when it is hazy or mildly overcast, which can produce very striking images. Again, select the Cloudy white-balance setting and start taking pictures. If the weather gets too cloudy, though, many butterflies will seek a place to hide—possibly in anticipation of a summer thunderstorm.

**Shade.** Although they tend to prefer the full sun, you will also find butterflies in the shade. Some species of butterflies even thrive in shaded areas of the woods or in rain forests. When you encounter butterflies in a shaded area, you should first try the Shade white-balance setting. If it becomes too shady, consider using a flash unit to supplement the existing light. If you do, be sure to switch your white-balance setting over to Flash.

**Dappled Light.** The most challenging lighting to work with occurs in shaded areas where sunlight streams in through portions of scene. What usually happens is that the camera can't deal with the differences between the full sunlight (say,  $\frac{1}{125}$  second at f/16) and the shaded area in the scene (say,  $\frac{1}{125}$  second at f/5.6). Something has to give, so either the sunny areas will be blown out (overexposed) or the shaded areas will be too dark (underexposed). Since butterflies fly under and around flowers, this is a fairly common problem. To deal with this, you can try using flash at a very low power setting and/or with

This tropical Clipper (*Parthenos sylvia*) was photographed inside the butterfly house at Brookside Gardens in Wheaton, MD. The image was taken at  $\frac{1}{1000}$  second at f/5.6 without flash! Note the iridescent colors on the wings. I'm reasonably sure that those colors would not have been visible if I had used a flash.



extra diffusion (see sidebar to the right). A reflector can also be used to bounce extra light onto the subject.

## Flash

As noted above, there are times when the natural light alone will not allow you to create a decent photograph. This requires you to use a flash.

My results when I first began using flash were not positive. I found that, more often than not, I blew out (overexposed) my subjects. To compensate, I developed my own butterfly flash unit. This was built around a Bogen mount and featured two flash-unit holders that could be adjusted in either direction. On the left mount, I placed a Sunny Boy flash (a very inexpensive flash that uses one AAA battery) with a folded-over Kleenex taped to the front. This was attached to the hot shoe. A second Sunny Boy, placed on the right mount, held a slave unit that flashed automatically when the first flash fired. It too was covered with a white Kleenex. When fired, the units produced a gentle light that extended out around 24 inches.

The results were great and I used that system up until the early 2000s, when the first Nikon F100 came out with a new flash system that provided really outstanding flash—and I was still able to pack the diffusers with some paper to further diffuse the subject. Since then, I have moved on to the Nikon D100 with SB-28 flash unit, to the D200 with the SB-800 and one of Gary Fong's light diffusers ([www.garyfong.com](http://www.garyfong.com)), and now to the D300 and D700 with the Quantum QFlash. Most of the time the results are reasonably dramatic. I still, however, prefer a muted flash and will try other options—including using my fingers over the diffuser, bouncing the flash off a diffuser, pointing the flash straight up while using the pull-up diffuser, or other variations using Gary Fong's diffusers.

If you have an assistant, you have even more options—you can move your flash off the camera. To do this, you need a cable (e.g., Nikon SC-17 or SC28) that attaches at one end to your hot shoe and to the flash on the other end. With this setup, your assistant can move the flash closer in or further back as you wish. They can even bounce the flash backwards into a white reflector or through a white umbrella.

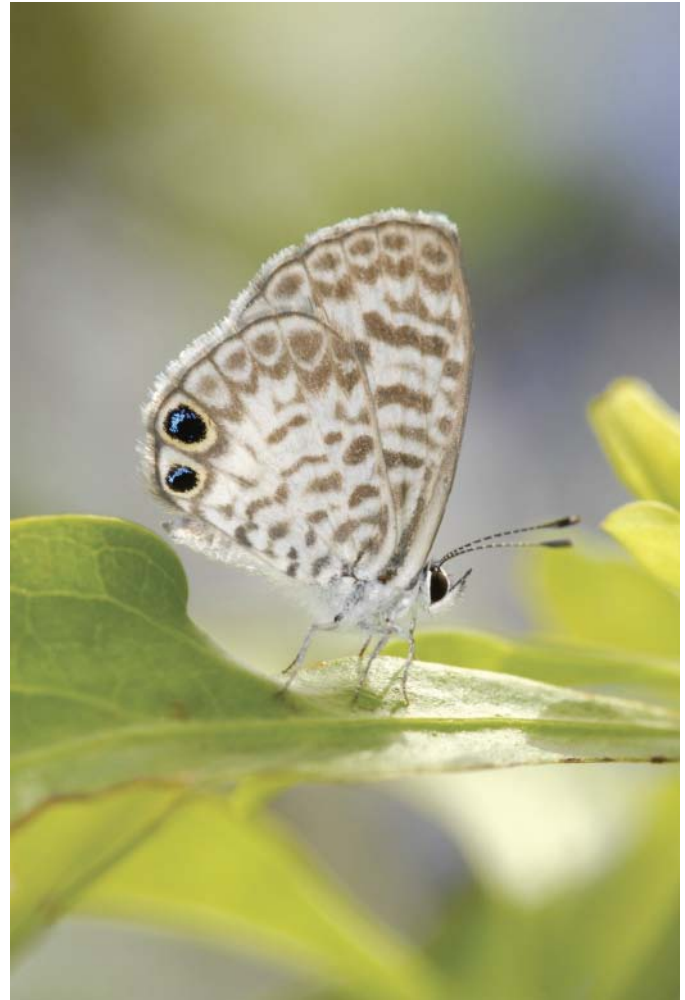
Flash can also be used to capture a butterfly in flight. To do this, set your camera's shutter speed to the flash sync speed (usually  $\frac{1}{125}$  to  $\frac{1}{250}$  second). Then, dial down your flash unit's power to a low output level. In bright sunlight, the flash will produce a very short pulse of light that should help capture the butterfly flying about. Unfortunately, it sometimes requires the use of more than one flash unit to work properly—and getting the camera to focus on the erratic flight pattern of a butterfly takes more skill than I seem to possess!

As this book was nearing completing, I purchased Nikon D300 and D700 cameras and experimented using a Nikon SB-800 Flash unit set on manual and dialed down to some of the lowest settings ( $\frac{1}{32}$ ,  $\frac{1}{64}$ , or  $\frac{1}{128}$  second). I also ex-

## Extra Diffusion

Placing a white Kleenex inside a plastic flash diffuser adds an extra layer of diffusion. However, using paper next to some flash unit may be dangerous! Some flash units produce a lot of heat and paper touching the flash might catch fire. Consult the manual that came with your flash to determine if this technique can be used safely. If not, you can also tape paper on the outside of a plastic flash diffuser to soften the light.

If you have an assistant, you have even more options—you can move your flash off the camera.



Here we have two photographs of the Cassius Blue (*Leptotes cassius*). The first one was taken under natural light (left). The second was taken using a flash unit that was covered with a diffuser that had a handkerchief stuffed inside it to further reduce the output of the flash (right).

perimented shooting with and without the Nikon diffuser. Because both cameras are much better equipped to handle noise, I was able to boost my ISO up 800 to 1000. I set the camera to Shutter Priority mode at a setting of  $\frac{1}{250}$  second (the fastest sync speed for the camera with the SB-800). I eventually settled at a flash setting of  $\frac{1}{64}$  second with a diffuser as giving me almost perfect exposures in a shady or overcast setting. In bright settings I simply dial the flash unit down to  $\frac{1}{128}$  second or reduce the ISO settings. This technique has helped me produce some pretty sharp images.

If your budget allows, probably the best flash unit for photographing butterflies is a ring flash. This is a unit that fits onto the front of the lens, surrounding it with a ring of small light sources that can be controlled independently. You can fire all the flashes together, trigger them individually, or fire them in groups (the top flashes only, the left or right sides, etc.). The versatility this offers is obvious.

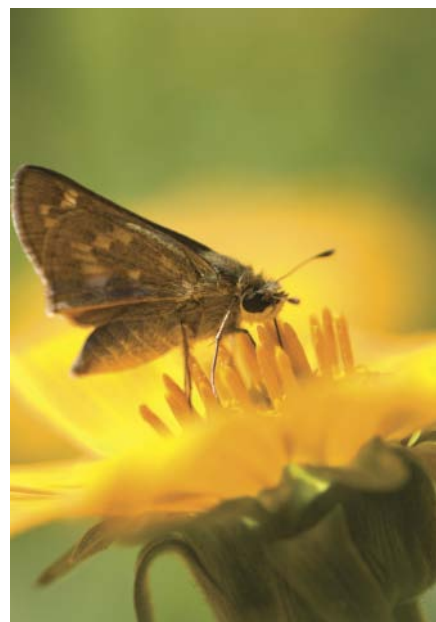
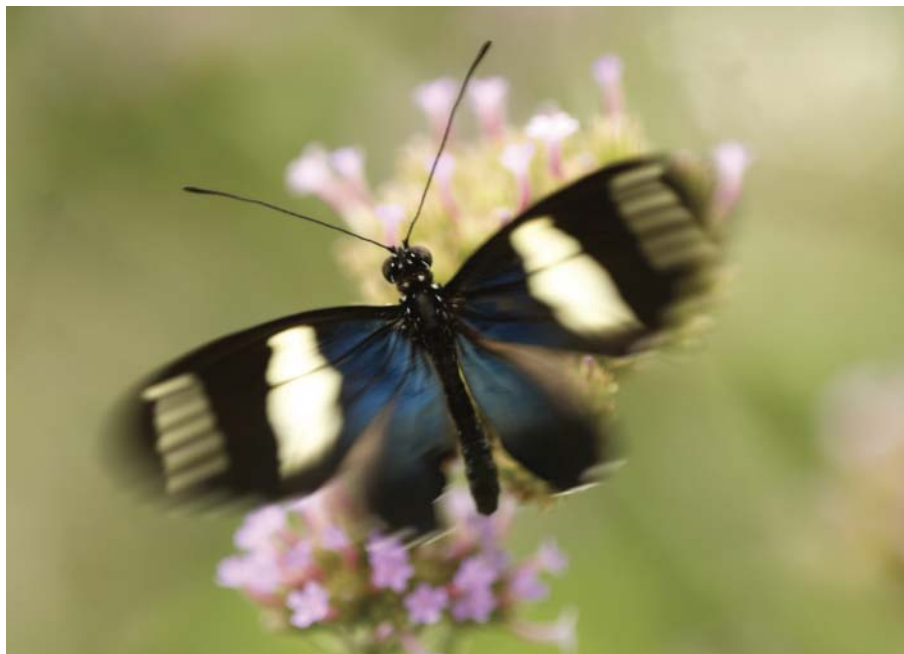
### Light Modifiers

Using a white umbrella or a scrim to soften the light works well for flowers, but it's not so practical for butterflies. First, butterflies are skittish creatures and a



large object suddenly appearing overhead tells them it is time to move or be eaten. Second, you really need an assistant to handle either object, and most butterfly photographers work alone. If you do have an assistant and want to try using a modifier remember that light tends to flow down, not up; make sure the assistant is pointing the umbrella or scrim in the right direction. (*Note:* Light modifiers do not have to be man-made. Often I don't need any additional fill to illuminate the underside of a butterfly; the flower's petals or the stamen to the job for me.)

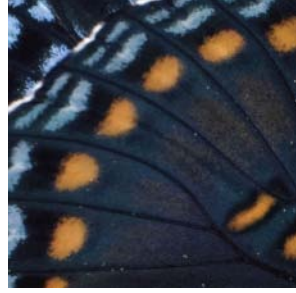
In short, lighting and proper exposure have become, for the most part, secondary concerns for butterfly photographers. Today's cameras do an incredible job, allowing you to concentrate more on finding and approaching your sometimes elusive subjects. You'll only have to step in when you realize that the camera is recommending an inappropriate exposure value that will not work with the color or quick movement of the subject. Only then should you alter the camera's exposure setting to compensate for what you—and not the camera—can actually see.



Light bouncing up from the flower does a great job of reducing the shadows on the underside of this Sachem (*Atalopedes campestris*).

Your camera simply doesn't know if your subject (here, a tropical Sara Longwing [*Heliconius sara*]) is moving (top) or still (bottom). The camera is programmed to give you the combination of shutter speed and aperture needed for a perfect exposure. You, on the other hand, know that you must increase the shutter speed and reduce the aperture setting if you are to control the subject's motion. It won't surprise me a bit if future digital cameras are able to detect and compensate for motion. Until then, though, it is up to you to make those necessary adjustments.

## 8. Composition



Good composition, the careful use of lines, balanced colors, and a soft background are all factors that help turn a good photograph into a superb photograph. The following are tips learned over many summers of photography.



This image of a Painted Lady (*Vanessa cardui*) is technically “good.” Everything is in focus and the butterfly is sharp. However, it is also hard to see the butterfly because of the confusing colors and shapes in the background. The aperture setting of f/13 produced a much sharper background than I wanted. A wider aperture setting, to blur the background, would have been a better choice.

### Background

The longer I take photographs, the more I value a good background—one that is beautifully blurred and doesn’t contain elements that will draw the viewers’ eyes away from the subject.

After photographing the same butterflies season after season, I now look for an interesting background first and then see how I can use it to produce a visually stunning final image. When observing butterflies darting from one flower to another, I’ll look to see if I can find a bed of colorful flowers five to ten feet away. I’ll then find a flower that has a suitable (or interesting) color and will align myself so the background flowers line up with the target flower. I then will wait until someone lands on the target, and I’ve got a fun picture. (*Note:* When looking for suitable backgrounds, be especially watchful for white objects. A small white object in a background of greens, for example, invariably pulls the viewer’s eye towards that white spot.)

To generate a beautiful blur on the background you can use two techniques. (1) Choose a telephoto lens—200mm or more. This will focus sharply on the subject while automatically tending to blur the background. The further away the background is from the subject, the more blurring will occur. (2) When shooting in the manual mode, select the widest available aperture setting to create a narrow depth of field. This works especially well with telephoto lenses over 150mm, which on their own do a decent job of blurring. It won’t work as well with moderate lenses (under 150mm). (*Note:* Wide-angle lenses are de-



**LEFT**—This Silvery Crescentspot (*Chlosyne nycteis*) was a rich brown with orange spots. Just about anywhere it landed in this field of flowers resulted in a great shot. By increasing or decreasing your aperture you can further blur or sharpen the background. **ABOVE**—This Peck's Skipper (*Polites peckius*) was actually sitting reasonably still. Because I wanted to contrast the gold in his wings against a rose background, I shot this at  $\frac{1}{1000}$  second at f/8. The skipper is in focus, but the flower behind it is beautifully blurred. **FACING PAGE**—The photograph of this tiny Gray Hairstreak (*Strymon melinus*) illustrates the beautiful softening effect obtained when using a macro telephoto lens (the focal length for this image was set at 180mm) with an aperture setting of f/6.3. The shutter speed was set at  $\frac{1}{160}$  second. I used spot metering for both focus and exposure.

signed to produce sharp backgrounds and are not suitable for most butterfly photography.) If you are working in the Shutter Priority mode, using the fastest shutter speed that your lighting conditions will allow causes the camera to select a wide aperture for a narrow depth of field. I normally start at  $\frac{1}{250}$  second, then try  $\frac{1}{500}$  second and  $\frac{1}{1000}$  second if necessary.

### Foregrounds

A dead leaf, a twig, or something unexpected in the foreground can also distract from the photographs. Because you never really have time to prune every





### ***An Additional Benefit***

One benefit of using a fast shutter speed is that it really stops motion. There are some butterflies (notably some Swallowtails) that constantly flap their wings as they feed. Stopping that action may require you to use shutter speeds of up to  $\frac{1}{1000}$  second. A fast shutter speed also allows you to hand-hold telephoto lenses in the 200mm to 400mm range, especially if the camera or lens features a vibration-reduction (VR) or image-stabilization (IS) feature that helps dampen movement.



I photographed this Emerald Swallowtail (*Papilio palinurus*) in the Shutter Priority mode at  $\frac{1}{1000}$  second at f/4.5. I began at  $\frac{1}{250}$  second (my normal setting for photographing butterflies), but the results were all blurred; the Emerald flutters its wings constantly. I upped it to  $\frac{1}{500}$  second and still could not stop the beating of the wings. If you look really hard at the image, the wings appear to be slightly motion-blurred, although they may simply be out of focus. This image might have been aided by use of a flash at absolute minimum power to better freeze the subject.

setting in nature, you'll sometimes have to move or adjust your camera angle or deal with the problem using Adobe Photoshop. However, if you can, pack along a Swiss Army knife, or a set of scissors to remove the offending item (if time—and the butterfly—permits). This, obviously is a lot easier in your own garden. Some park rangers might take exception to you pruning their bushes for a better shot of a butterfly. Still, I don't think anyone will mind if you simply remove a dead flower from a plant.

### **Angle of the Butterfly to the Camera**

How the butterfly appears in your view screen will influence the sharpness of the finished product. Since you generally want a really sharp image, you'll learn how to position yourself or to wait until the butterfly aligns itself with your



I like the image of this Common Checkered Skipper (*Pyrgus communis*) except for the tiny, blurred white dot under its left wing. Little objects, particularly white objects, will pull the eye away from the main subject. There are also a few dark objects in the background, but they don't tug at the eye the way light-colored objects do.



This Red Rim (*Biblis hyperia*) from Central America was photographed almost totally perpendicular to the camera. The result is a subject where just about everything is in focus. Look at the plant under the Red Rim to see how shallow the depth of field really is. This image was shot at  $\frac{1}{160}$  second at f/5.6.

camera. Otherwise, you'll need to know how to deal with situations where you can't get a perfect alignment.

**Perpendicular.** You will get the sharpest images when the butterfly is completely perpendicular to the camera (*i.e.*, you are looking squarely at the flat area of the butterfly's wings). If you can adjust your position to get this view, everything should be in total focus—even at aperture settings below f/5.6 (although the antennae may not be as sharp if the butterfly were turned toward you). You can increase the area of the subject that is in focus by choosing an aperture setting from f/11 to f/22. These smaller aperture settings will, however, also reduce background blurring, so you need to find the right balance for each combination of scene and subject.

**At an Angle.** If the butterfly is at an angle—and they are constantly in motion, so they will be at a shifting angle most of the time—you will begin to see areas that are not in focus. If you choose to focus on the butterfly's eyes (a good practice), then the forward part of the antennae and the back part of the



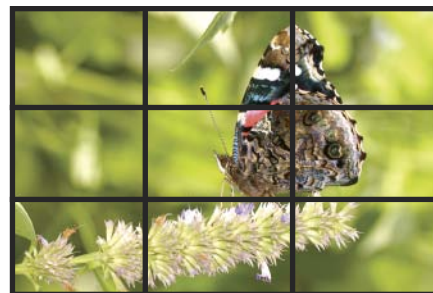
butterfly's tail are likely to be out of focus. As long as the eye is sharp, though, having those parts out of focus won't be a significant problem. However, if you want the entire angled butterfly to be in focus, you will have to reduce the size of your aperture  $f/16$ ,  $f/22$ , or  $f/32$ . If you are using a telephoto lens, even these aperture settings might not work. You might also have to back away a little to change the depth of field of the lens so that a tiny bit more will come into focus. Again, though, I've found that if the eyes are sharp, the viewer will accept areas that are out of focus toward the back of the image.

### Additional Tips for Composition

**Get a Different Perspective.** Most beginners approach photographing a butterfly in the same way: they place their feet together, bend over from the waist, and shoot down. This results in images that are pretty predictable. For something that really stand out, you need to vary the angles. Shoot parallel to the butterfly. Shoot it from below looking up. Constantly look for ways to capture images in a fresh new way. This will come with practice.

**Use the Rule of Thirds.** The Rule of Thirds is a guideline that helps photographers produce more interesting images. According to this rule, the frame is divided into thirds both vertically and horizontally (imagine a tic-tac-toe board being superimposed over the frame). Placing your subject at one of the points where the vertical and horizontal lines intersect can give it more visual

The Red Admiral (*Vanessa atalanta*) seen below could have been centered in the middle of the picture (many of my images are), but sometimes the application of the Rule of Thirds (see diagram to the right) can produce a more interesting image.



Stalks of purple sage point up toward the Monarch (*Danaus plexippus*). The purple color contrasts nicely with the orange and black wings of the Monarch.



emphasis. Of course, this isn't much help if the image in your viewfinder is filled with just a butterfly, but if there are other elements in your picture, shifting the camera to place the butterfly at one of those intersections will produce a more interesting image.

**Look for Lines.** The lines created by leaves and stems can also be used to lead the viewer's eyes towards the subject. Our eyes tend to follow lines when we see them, so look for ways to compose your images in such a way that any lines that appear lead toward the subject of the image—the butterfly.





Despite all this “sage advice” from me, the fact is that the butterfly itself is largely responsible for what I photograph. Sometimes, I’m just lucky to get even a quick shot. Most of the time I am busy trying to get the eyes in focus as the creature moves about. Rarely do I have the chance to actually figure out exactly what I want to do. So don’t be discouraged—just keep clicking.

### Try Adobe Photoshop or Elements

Sometimes, despite all your efforts, an otherwise decent photograph will have something in the foreground or background that distracts from your subject. In this case, you can consider removing the distraction with Adobe Photoshop or Elements. The pair of images above show how I used Photoshop to remove an out-of-focus line in the background that I just found to be obtrusive. I also use Photoshop to make brightness and contrast adjustments, and occasionally to increase the saturation of my images.

**LEFT**—This image of a newly emerged Spicebush Swallowtail (*Papilio troilus*) has a diagonal line stretching behind the butterfly. I think it makes the image, otherwise a very nice photograph, unusable. **RIGHT**—Using Adobe Photoshop I blurred the background (using the Paint Brush and Healing Brush features) and now the image is usable. Purists will argue that altering an original image in any manner is unconscionable and must never be allowed. But do you really want to discard a great image that can be fixed? My approach is to fix it but not to hide the fact that the image has been digitally altered.



## 9. Getting the Shot



Taking great images of wild butterflies requires some advanced planning and use of several techniques (some of which I've already mentioned). These are some of the steps I take when photographing butterflies in the wild.

### **Advance Preparation**

If I am going to travel to a new destination, I frequently use the power of the Internet get some tips. Let's say you are going to Guatemala and want learn a little about local butterflies. Just go to [www.google.com](http://www.google.com) and type in "Guatemala+butterflies." You will receive quite a few "hits" that can help you plan your trip. It always surprises me just how much information you can retrieve using the Internet.

### **Before Heading Out the Door**

Take a glance outside and see if it is sunny, partly sunny, or overcast. Then get your camera out and change the white balance to the appropriate setting. Is it a little dark out? Set your ISO up a little higher. Is it bright? Set the ISO just a bit lower. Next, decide if you are going to shoot in the shutter priority or aperture priority mode and dial in your settings (say,  $\frac{1}{250}$  second for shutter priority and f/8, f/11, f/16, or f/22 for Aperture Priority). Select the spot metering setting for your light meter, and consider using the spot focus setting to help you photograph the butterfly's eyes. And make sure you have fresh batteries in your camera!

### **When You Spot your First Cluster of Butterflies**

Now is the time to pull your camera out and make final adjustments. Do you want to use the camera's automatic focus? Do you want to set the camera to



A Gray Hairstreak (*Strymon melinus*) will, if approached slowly, give you a lot of practice taking photographs, because it generally spends a few minutes carefully visiting each flower before flying off to another flower.

manual? Do you need your lens shade or can you remove it? Will the sun be behind you so you'll be casting a shadow?

### **A Moment of Observation**

Wild butterflies are erratic at best, so it is wise to observe their activities for a few moments before you make a move. Are they busy feeding? How long do they spend at a single flower before they take off? Will they make a rotation around the top of the flower or just a single stop? Will they return to the same flower? Once you've watched them for a few seconds you will know how to approach them. If they are constantly moving, you might want to opt for a higher shutter speed. If they are feeding or resting, then you might lower your shutter speed and decrease your ISO for less noise.

### The Approach

As described in chapter 2, approach your subjects slowly and steadily. Don't make any sudden movements and try to avoid casting shadows on the butterflies. Now, it's finally time to take some pictures!

### A Solid Stance

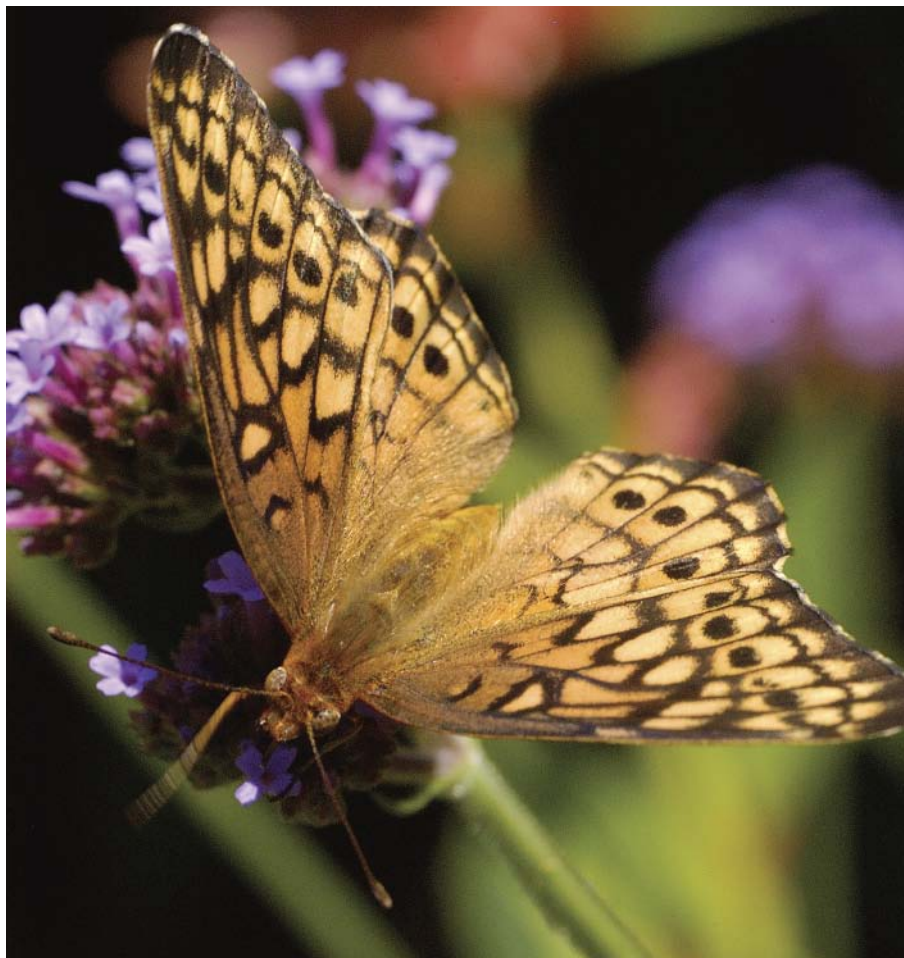
Tripods, the most basic support for cameras, unfortunately do not work well in butterfly photography. The butterflies jump from one flower to another and rarely stay in one place for more than a few seconds. There are exceptions, but nine times out of ten you will do better leaving the tripod back in the car. I've also tried using a monopod, but gave up after many unsuccessful attempts.

The Ruddy Daggerwing (*Marpesia petreus*) is typically found in Florida and south to Brazil. This Daggerwing was photographed in Corkscrew Swamp just east of Naples, FL, where they were flying about in fairly good numbers in September. I used a vibration reduction (VR) lens, which gave me good results despite the sometimes poor lighting in the swamp.

Instead of using a monopod or tripod, you will do better to develop a steady but flexible stance. Beginners tend to hold their small point-and-shoot cameras out at arm's length and peer into the LCD screen on the back from a distance. This results in a good *amateur* picture; blow the image up several times and you are likely to find that it is soft and slightly (or significantly) blurred. The stance used by these beginners, although intuitive perhaps, is inherently unstable and prone to movement, which leads to blurring.







LEFT—A Variegated Fritillary (*Euptoieta claudia*) is usually fairly abundant in the southern portion of the United States.

FACING PAGE—A Monarch (*Danaus plexippus*) feeding in the warm summer before flying south to its winter grounds in Mexico, where they gather by the millions.

Over the course of many years, I have adopted a shooting style that gives me reasonably good support while allowing a rapid back-and-forth movement. Here are the steps I suggest:

1. Place your weight on your left foot, which should be positioned as close to your subject as you can get it.
2. Place your right foot about two feet behind you. You can then use the right foot to gently push yourself forward or to pull yourself backward. This gives you a lot of freedom of movement, yet you remain balanced.
3. Then, place your left hand out with the palm of the hand facing up. When you push down on the palm of your hand, the tendons will allow a little give—but not much. This creates a nice platform to steady the barrel of the lens.
4. Place your right hand on the camera, pulling it to your forehead where you can click the shutter and see through the view screen.
5. Tuck the elbow of your left arm against your chest. You now have a steady shooting platform that allows you to move back and forth quickly, easily, and steadily.



6. Take a deep breath and slowly exhale as you press the shutter button for each exposure.

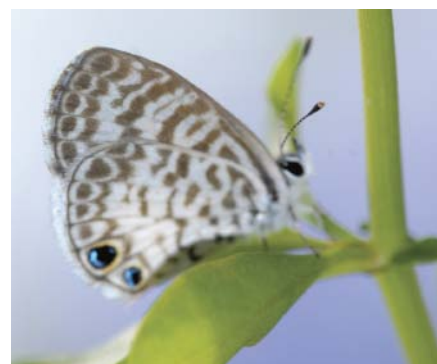
Using this method, I find that I can take acceptable handheld photographs with a 70–180mm zoom lens or a 200mm fixed macro lens (and sometimes with a 70–300mm VR lens) at  $\frac{1}{125}$  second using an ISO setting of 100. I'll use this stance in the shade or in cloudy settings when I choose not to use flash. I can sometimes get away with lowering the shutter speed down to  $\frac{1}{60}$  second—and occasionally down to  $\frac{1}{30}$  second. At those lower shutter speeds, I know that I will need to take many extra shots, because quite a few of them will be blurred. One or two, however, will usually come out very sharp.

### Entering the Zone

We talked earlier about butterflies' fright or flight zones. The secret to great butterfly photography is learning how to enter those zones, take your picture, and get out before the butterfly knows what has happened. Here is how I suggest you go about it:

1. Get the camera ready. Select the proper ISO for the amount of light available, usually between ISO 100 and ISO 400. (*Note:* I don't go much higher because of the noise that results—although advancements in digital technology are quickly making noise issues a thing of the past, making it possible to use much higher ISO settings.) Next, set the camera to the Shutter Priority mode at  $\frac{1}{125}$  second. That is fast enough to stop most motion (but not flight). The camera will then automatically adjust the aperture settings. (*Note:* Alternately, you can set the camera to the Manual mode and choose both the aperture and shutter speed settings yourself.)
2. Then, switch the focus to manual. Modern lenses are fast, but they will occasionally spend too long searching for the subject—and you often have only a few precious seconds to find the butterfly and take the picture. With the focus set to manual, you can move in and out (using the stance described above) to place the point of focus without having to refocus the lens. Use your eye to determine when the subject is sharp.
3. Position yourself as close as you dare to the subject and begin moving backwards and forwards. Once you know that you can get the subject in focus, start taking photographs. Initially, you may be outside the butterfly's fright or flight zones and it will continue what it is doing. Then, take another step forward and repeat the process. If the butterfly stops feeding, you know you've reached the first zone (fright). Maintain your position, but keep on moving

Modern lenses are fast, but they will occasionally spend too long searching for the subject.



This image of a Cassius Blue (*Leptotes cassius*) shows that my in/out motion failed. The only part of the butterfly that is in focus is a small part of the antenna. At these close distances, using high magnification, the depth of field gets incredibly tight. Images like this are discarded.





LEFT—This image of a Gray Hairstreak (*Strymon melinus*) is spot-on. I sometimes spend an entire morning trying to get this accuracy in my focusing. RIGHT—The second image shows how easy it is to miss, ever so slightly, the perfect focus.



back and forth, in and out. If the butterfly flicks its wings, it is getting ready to flee and you should slow down. If not, try to close the distance by rocking forward and backing off. This allows you a brief second inside their fright zone—and possibly even into their flight zone—but then you're out.

In my experience, this technique works more often than it fails (see an exception on the facing page!). Once the butterfly accepts you as just one more object swaying in the wind, you can slowly work your way forward until the minimum focus distance of the lens prevents you from getting any closer. At that point, you should be close to shooting full-frame images of your subject.

Sometimes, the butterfly will accept you and you can continue taking photographs for a while. Many of the images won't be perfect. It is difficult to hit it perfectly all of the time, but this is where the digital really works in your favor: you can take lots of photos and delete the ones that didn't make it.

Eventually, the butterfly will take off in search of another flower. Take a moment to review the images. Are they under- or overexposed? Check your histogram; it is an invaluable tool. Can you tighten up a bit or do you need to back off a bit? Are you capturing the entire butterfly or are you cutting off the top or sides? This is your time to make tiny adjustments.

You can now wait for another butterfly to arrive, or shift your position slightly. At this point, the odds are good that you will be able to approach another butterfly of that same species without using that slow initial approach.

### Raising the Bar

Although you now have a good grasp of what is needed to get in tight, you still can improve. The first thing is to practice, practice, and practice. Why? You are operating in very tight conditions where errors are easily magnified. As you move in and out, your eyes are searching for the perfect focus. Your mind



“sees” that perfect focus and signals your finger to click the shutter. Your finger depresses the shutter and the camera takes a picture—but between the time you commanded your finger to take that picture and the millisecond later when the shutter actually opens, you’ve moved!

You’ll need to practice shooting until it becomes second nature—and even then you’ll have plenty of discards. For practice, try shooting a line of multi-colored push-pins stuck in a wooden ruler. Focus on one particular pin and put the results up on your screen and blow the image up. You’ll quickly see if you are hitting the mark or if you need more practice.

Once you get back outdoors and begin photographing with your newly honed skills, you’ll also need to remember to photograph the whole butterfly! Sorry—you can’t crop off the antennae or part of the wings. And, of course, all of this must be happening as the butterfly wanders around on top of the flower and you move in and out!

### Going all the Way

Just when you think you finally have everything under control, I have to hit you with one last, seemingly impossible task: you need to keep the butterfly’s eyes in focus. (Hey, I never said this would be easy!) If you can master this final step, you will truly be a great butterfly photographer. Before you give up in disgust, rest assured that even the world’s best nature photographers throw away a lot of butterfly images because the eyes are just not right or because they clipped off part of the wing, or because something is blurred. The fact that you won’t succeed all of the time makes it all the more gratifying when everything does come together to create a truly superb photograph.

**LEFT**—A Cassius Blue (*Leptotes cassius*) with the eye out of focus but with the wings in focus. This is a nice shot, an interesting shot, but not a great shot. **RIGHT**—A fraction of a second later and the wings are out of focus, but the eyes are sharp. The human eye is more accepting of a gradual blurring of the background if the eyes are sharply focused. **FACING PAGE**—Another fraction of a second and everything comes together nicely.







## 10. After the Shoot

One terrific aspect of digital photography is that you can see precisely what you did as soon as you download your images. Most digital-imaging programs will give you all kinds of information about your camera settings for each specific shot (this is called the meta-

data). If you have photographed in the Shutter Priority mode, for example, you can track the fluctuations in aperture settings and see which combinations gave you the best images. Were your shutter speed selection too high or too low? If the butterfly is blurred—and you can easily blow the image up several times to reveal motion—the next time out, you’ll know that you need to use a faster shutter speed. If not, perhaps you can lower it and have better depth of field during your next outing. Constantly checking and adapting your strategy help you begin to develop your own shooting style.

### Processing Your Images

As mentioned in chapter 6, you’ll have the most flexibility at this stage if you shoot in the RAW format. There are many exciting new programs designed to help you work with these files, which actually rival the quality of film. I have used Capture One Pro to increase or decrease the brightness and saturation of my RAW images. Once I have converted these images over to a TIF or JPEG format, I can then use Adobe Photoshop to fine-tune each image prior to using it for high-quality prints or in a digital slide show.

If you decide to shoot in the JPEG format, there are still plenty of things you can do to refine your images using Adobe Photoshop or another image-editing program. Minor color and contrast adjustments, brightness tweaks, cropping, light sharpening, and a host of other changes can be made to make your image look its best.



A newly released Spicebush Swallowtail (*Papilio troilus*) finds an unusual spot to get ready for its first day of freedom. The butterfly was raised and released by Mona Miller at Meadowlark Botanical Gardens.



Identifying butterflies can be a challenge—especially when it comes to exotic species from around the world. This is one of several that has eluded me. I believe this is a *Parthenos sylvia* from India.

### Printing Your Images

One of the most frustrating thing that beginners—and a fair number of professionals, as well—encounter is the difference between what they think they photographed, what they saw on their monitors, and what was finally printed. It is beyond the scope of this book to describe everything that goes into printing beautiful digital images. However, there are a few tips that might serve you in the future:

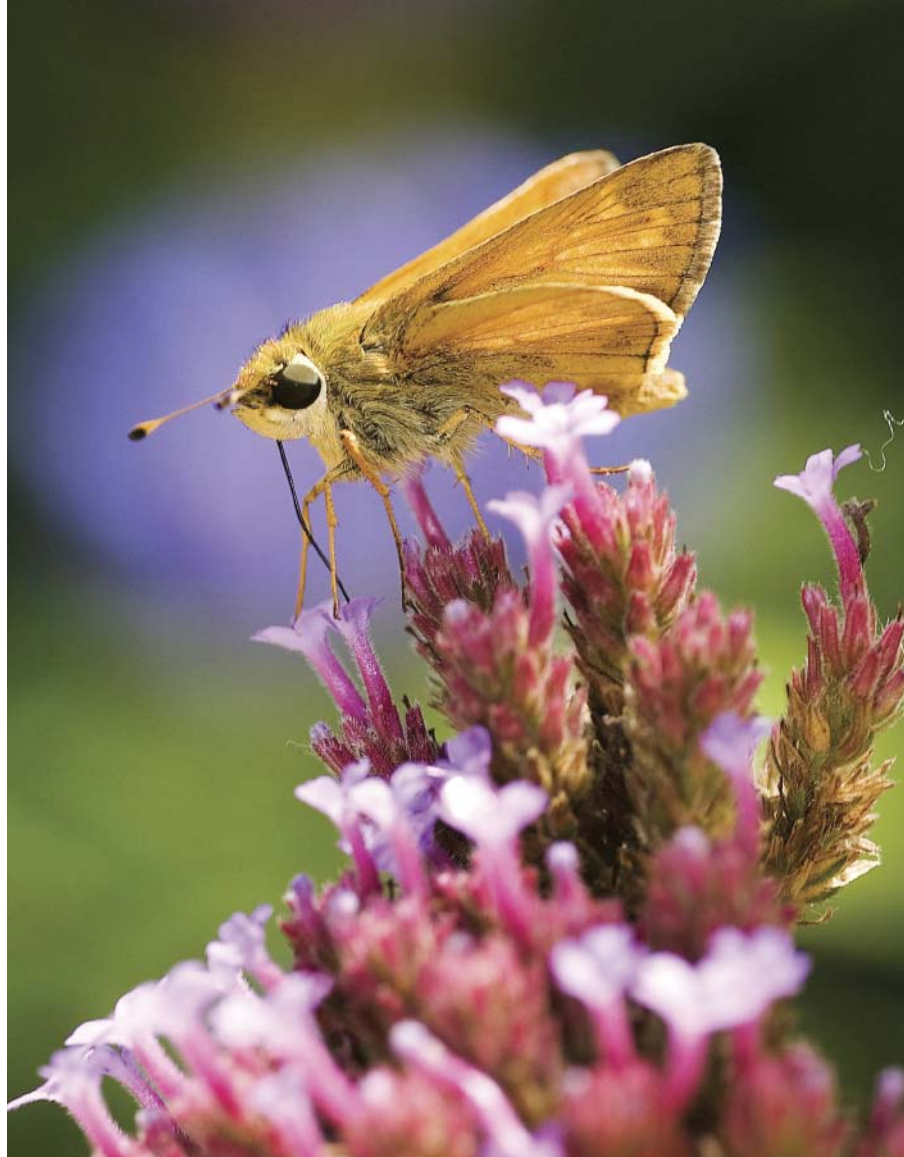
- If you can afford it, buy a calibration system that will help you adjust your screen. That will help start the process.
- Set your camera, your image processing software, and your printer's output software to the same color model (for example, consistently use sRGB or Adobe RGB).
- Use the software provided by your printer's manufacturer. If the same company produces a line of printing paper, try using that as well.







FACING PAGE—Gray Crackers (*Hamadryas februa*) are normally found south of the U. S. border. This one was photographed in Costa Rica. RIGHT—A Fiery Skipper (*Hylephila phyleus*) usually tolerates a close-up shot—but because it also spends a lot of time chasing other skippers, it is still hard to photograph.



- Use the brand of inks that came with your printer and be sure to use your printer on a fairly regular basis to keep the ink nozzles from clogging. You can sometimes save some money using less expensive ink, but those inks might not be designed to give optimum results on specific brands of paper.
- Don't be afraid to experiment. I have found that I can produce pretty good images on a consistent basis by first making sure that my histograms are as tightly balanced as possible and then adding a little saturation to the final image.

If all of this sounds too complicated, you can always take your photos to a photo lab or printing kiosk, where you can produce surprisingly good prints with a little assistance from the staff. There are also many web-based companies that will produce excellent prints for you. The nice part of the digital era is that it is becoming easier and easier for you to produce really good prints at very reasonable prices.



# Conclusions

Taking great images of butterflies can be tremendous fun for beginners and advanced photographers alike. Those who enjoy the outdoors will find that it adds to their enjoyment. Those who love hiking and camping will find many species of butterflies that city-

dwellers and suburbanites simply can't find. Those same city-dwellers and suburbanites, however, can always find butterflies to photograph in local parks and butterfly houses or on vacation. Even on a business trip, you can find butterflies at the end of the day by wandering out outside your hotel before the sun goes down.

## Future Trends

The digital age has literally revolutionized the field. Ordinary people can take great pictures and see the results instantly; advanced photographers can enjoy greater control—and look forward to ever greater developments, like higher ISOs, less noise, bigger LCD screens, faster lenses, better metering and focus systems, and an increased use of image stabilization in both cameras and lenses.

## Environmental Awareness

Hopefully, at least a few of you will become interested in expanding butterfly habitats in your area. It does not take a great deal of effort—a few native species planted in a garden will make life just a little easier for a creature that can bring life and action to your garden.

If you're a little more ambitious, you can work on convincing your local authorities to set aside a plot where native plants can be established. You can also help by educating the people around you. Many people harm butterflies with-

Hopefully, at least a few of you will become interested in expanding butterfly habitats in your area.

Gray Hairstreaks (*Strymon melinus*) add a touch of beauty to any garden. They rub their back wings in opposite directions in hopes that a predator will mistake the false face and “antennae” for their head. If a bird strikes at the false face, the butterfly lives to enjoy another day.

out knowing what they are doing: spraying for weeds because the lawn must look uniformly green or running for the bug spray to stop caterpillar “infestations.” In my own condominium community, the board of directors decided to improve the look of the grounds by getting rid of a lot of ugly “weeds.” They hired a contractor to come in and spray. Within two days of that spraying there were no more butterflies. None. Soon, dead birds littered the ground; they had eaten poisoned worms or insects. Now, nearly ten years later, only a few passing butterflies can be seen on our property. In the process we lost an





established community of Great Spangled Fritillaries whose host plant, the wild violet, was just one of the “ugly weeds” that needed to be destroyed! At least now weeds do not bother us.

You can start educating your community by taking some really good photographs of the butterflies in your area. Enter two or three of your photographs in a local competition. When people come up, tell them where and how you photographed each shot. After a few seasons, put up a small exhibit of your best butterfly photographs in your library, church, or recreational facility. Again, talk to visitors about your butterfly resources. After a few more seasons, maybe you can approach a public school and offer to give a class and take the children out to see butterflies at some of your favorite spots. Who knows what that reaction will be? Perhaps the children would like to build a butterfly garden around their school! Now’s the time to send a couple of images over to your local newspaper asking them to attend the groundbreaking. Once you know the newspaper reporter, ask them to join you on one of your butterfly walks; you can point out problems with environmental “mismanagement” along the way.

A Zabulon Skipper (*Poanes zabulon*) seen resting on a leaf.



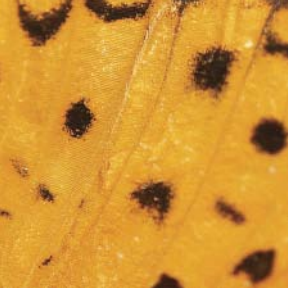


The Common Leopard (*Phalanta phalantha*) of Africa, Asia, and Southeast Asia.

That's about all you really need to do. Slowly, slowly involve others in your hobby or mission. Convince others to plant a few native plants in their gardens. See if the churches in your community could join you in planting just a few. Retirement homes love to attract butterflies for the enjoyment of their residents. Why not provide them with a list of local host plants and maybe an exhibit of your work? You can see how one thing can lead to another. By then, you should be a member of a couple of organizations devoted to helping out butterflies—if for no other reason than to obtain their publications and keep yourself informed. The North American Butterfly Association has a very nice publication and perhaps you'd like to join it for information and inspiration.

The solution is simply a few concerned individuals willing to make an effort, a small effort, to stop the relentless loss of habitat. Perhaps you will be one of those. Make it your goal to help sustain just one species of butterfly in your lifetime, so that your children's children can share in your love of butterflies. That's my goal in life now: to help save one species of butterfly.

Now, get your camera and head outdoors. You've got a beautiful day out there just waiting for you—and you are now well versed in how to take some stunning photographs of butterflies!



# Appendix

## Web Sites

There are hundreds of thousands of web sites on butterflies. The following are just a few of the sites that I have found useful.

### All About Butterflies

[www.enchantedlearning.com/subject/butterflies](http://www.enchantedlearning.com/subject/butterflies)

*A source of information for students doing a school paper about butterflies.*

### Butterflies and Moths of North America—Montana State University

[www.butterfliesandmoths.org](http://www.butterfliesandmoths.org)

*A fine source of information about North American butterflies.*

### The Butterfly Web Site

[www.butterflywebsite.com](http://www.butterflywebsite.com)

*Check out their “Butterfly Gardening” page for a nice list of butterfly species, their host plants, and favorite nectar sources.*

### Children’s Butterfly Site

<http://bsi.montana.edu/web/kidsbutterfly>

*A children’s guide to butterflies, sponsored by Montana State University.*

### Electronic Resources on Lepidoptera

[www.chebucto.ns.ca/environment/NHR/lepidoptera](http://www.chebucto.ns.ca/environment/NHR/lepidoptera)

*Provides links and information about butterflies around the world.*

### eNature.com

[www.enature.com](http://www.enature.com)

*A great guide to butterflies. Click on “butterflies” on their Field Guides, then on the family of butterflies, and then on the individuals in that family. Quick, easy, and informative.*



**Insect Images**

[www.insectimages.org](http://www.insectimages.org)

*A site for factual identification of various insects using photographs. Select “Lepidoptera” and it will list hundreds of moths and butterflies. A bit on the scientific side but very accurate.*

**Jeff’s Nature Home Page**

[www.duke.edu/~jspippen/nature.htm](http://www.duke.edu/~jspippen/nature.htm)

*The site of a remarkably good photographer. Beautiful photographs help you identify many species.*

**Lady Bird Johnson Wildflower Center**

[www.wildflower.org](http://www.wildflower.org)

*A great source of information about wildflowers in North America.*

**The Lepidopterists’ Society**

[www.lepsoc.org](http://www.lepsoc.org)

*The most authoritative source of information about butterflies in North America. It has a terrific series of pages linking visitors to butterfly web sites around the world.*

**McGuire Center for Lepidoptera Research**

[www.flmnh.ufl.edu/mcguire](http://www.flmnh.ufl.edu/mcguire)

*The Florida Museum of Natural History established for research into Florida’s butterflies and to increase public awareness through its living Butterfly Rainforest and other exhibits.*

**Monarch Watch**

[www.learner.org/jnorth/monarch/index](http://www.learner.org/jnorth/monarch/index)

*This site describes the migration of the monarch butterfly.*

**National Wildlife Federation**

[www.nwf.org](http://www.nwf.org)

*A source of information about wildlife issues in general. Has become more commercial in recent years.*

**Nature Conservancy**

[www.tnc.org](http://www.tnc.org)

*A source of information on local or regional wildlife habitats.*

### **North American Butterfly Association (NABA)**

[www.naba.org](http://www.naba.org)

*A membership-based, not-for-profit organization interested in the conservation, and increasing public awareness and enjoyment, of butterflies. The NABA has a link page that allows you to search for butterflies and butterfly organization on a state-by-state basis.*

### **North American Nature Photography Association (NANPA)**

[www.nanpa.org](http://www.nanpa.org)

*NANPA promotes nature appreciation and environmental protection while fostering understanding, professionalism, and ethical conduct in nature photography.*

### **The Smithsonian Institution**

[www.si.edu/Encyclopedia\\_SI/nmnh/buginfo/butterfly.htm](http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/butterfly.htm)

*A brief section on butterflies.*

### **The Xerces Society**

[www.xerces.org](http://www.xerces.org)

*An international non-profit organization that protects diversity through invertebrate conservation. Dr. Robert Michael Pyle established it in 1971.*

### **Butterfly Books**

There are many books on butterflies—just Google “butterfly books” and you’ll receive a long list. The following are a few that I have found helpful.

Branhagen, Alan. *The Gardener’s Butterfly Book*. National Home Gardening Club, 2001.

Brock, Jim P. and Kaufman, Kenn. *Butterflies of North America*. Houghton Mifflin Company, 2003. (I use this book all the time to help me identify butterflies.)

Cech, R. and Tudor, G. *Butterflies of the East Coast: An Observer’s Guide*. Princeton University Press, 2005.

Folsom, William B. *Art and Science of Butterfly Photography*. Amherst Media, 2000. (This was the original book I published and is still helpful for those who own cameras manufactured before the turn of the century.)

Mikula, Rick. *Garden Butterflies of North America*. Willow Creek Press, 1997.

Opler, Paul A. and Malikul, Vichai. *A Field Guide to Eastern Butterflies*. Houghton Mifflin Company, 1998.

Opler, Paul A. and Wright Amy Bartlett. *A Field Guide to Western Butterflies*. Houghton Mifflin Company, 1999.

- Pyle, Robert Michael. *The Audubon Society Field Guide to North American Butterflies*. Alfred A. Knopf, 1981. (Look for the latest edition. This is one of the best publications on North American butterflies.)
- Pyle, Robert Michael. *Handbook for Butterfly Watchers*. Houghton Mifflin Company, 1984.
- Roth, Sally. *Attracting Butterflies & Hummingbirds to Your Backyard*. Rodale Press, 2001.
- Schneck, Marcus. *Butterflies: How to Identify and Attract Them to Your Garden*. Rodale Press, 1990. (This is a guide to 250 of the most popular butterflies in North America.)
- Stokes, Donald and Lillian and Williams, Ernest. *The Butterfly Book: An Easy Guide to Butterfly Gardening, Identification, and Behavior*. Little, Brown, and Company, 1991.
- The Xerces Society and The Smithsonian Institution. *Butterfly Gardening*. Sierra Club Books, 1990.

***Interested in Purchasing Some of the Photographs  
Shown in this Book?***

Visit the Butterfly Photo Shop at: [www.byteland.com/butterflyphotoshop/index.html](http://www.byteland.com/butterflyphotoshop/index.html). There, you'll find many of the images shown in this book along with works by Terri Lynch, master graphic artist and naturalist. Fine prints, gifts, and apparel are all available for those who want to celebrate the wonder of butterflies.





# Glossary

**Adobe Photoshop.** Computer software that allows users to make adjustments (including brightness, saturation, color corrections, and more) to their digital images.

**Adobe Photoshop Elements.** A version of Adobe Photoshop designed for non-professionals but offering similar functionality.

**Aperture.** The settings on a lens that control the amount of light that passes through the lens. Aperture settings are called f-stops. Depending on the lens, they typically include standard openings of f/1.2, f/2, f/2.8, f/3.5, f/4, f/4.5, f/5.6, f/8, f/11, f/16, f/22, f/32, and f/64. Newer digital cameras allow you to use aperture settings between those shown above, such as f/6, f/6.5, etc. Aperture settings of f/2, for example, admit much more light than f/22. *See also* F-stops.

**Aperture Priority Mode.** An exposure mode in which you set your aperture and the camera automatically adjusts the shutter speed for a perfectly balanced exposure.

**Automatic Mode.** An exposure mode in which the camera automatically adjusts both the shutter speed and aperture to produce a properly exposed photograph.

**Blur.** (1) The soft, out-of-focus background produced when lower aperture settings (e.g., f/2) are used, or when using a telephoto lens up close, or when using an extension tube. A blurred background helps the subject stand out clearly. (2) Lack of sharpness caused by camera or subject movement when shooting at slow shutter speeds.

**Bracketing.** Shooting a sequence of images at slightly different exposure settings (above and below the metered

reading) to ensure that at least one image is perfectly exposed.

**Center-Weighted Metering.** A method used to measure the amount of light entering the camera and provide an exposure recommendation that places more importance on the tones in the center of the frame than those at the edges.

**Depth of Field.** The area in front or behind the subject that is in focus. Low aperture settings have minimal depth of field while high aperture settings provide greater depth of field.

**DSLR (Digital Single Lens Reflex).** A digital camera that permits you to change lenses. These are usually the higher end models, but camera makers are introducing less expensive cameras that allow you to change from a wide-angle lens to a telephoto lens at will.

**Focal-Length Factor.** A value used to determine how the focal length of a lens will change when used on a digital camera with a sensor that is smaller than a 35mm film frame. The factor typically ranges from 1.3x to 1.6x.

**Fill Flash.** Use of flash equipment to illuminate shaded areas of a subject. Typically, only a small amount of light is needed.

**Focus.** That portion of the subject that is sharp and not blurred. In butterfly photography, where the subject is tiny, the area in focus is often a narrow band. *See* Depth of Field.

**Focus Points.** Points in the viewfinder that the camera can be set to focus on.

**F-Stops.** *See* Aperture.

**Histogram.** A graphic representation of the tones in your image from pure white to pure black. Histograms are useful for evaluating the overall exposure of an image.

**ISO.** Designed by the International Standards Organization, a value used to describe the sensitivity of film or a digital image sensor to light.

**Image Stabilization.** A feature that helps dampen camera or lens shake when handholding the equipment. Also called vibration reduction.

**JPEG.** A file format used to save digital images. JPEG images are compressed, meaning some data is discarded in order to produce smaller files. This compression results in the loss of information.

**Lag Time.** The time it takes from the moment the camera's shutter release is pressed until the shutter opens and closes. Early digital cameras suffered from long delays, resulting in missing the action.

**LCD (Liquid Crystal Display).** The screen on the back and/or top of the camera where you can see images, histograms, menu settings, or camera settings.

**Macro Lens.** A lens that allows you to get very close to your subject and take very detailed images up close. *See* Micro Lens.

**Manual Mode.** An exposure mode in which you set both the aperture and shutter speeds.

**Memory Cards.** Devices used to store the information captured by the camera's sensor and transfer it to your computer.

**Micro Lens.** A lens that allows you to get very close to your subject and take very detailed images up close. *See* Macro Lens.

**Multiple Point Metering.** A method used to measure the amount of light entering the camera by evaluating multiple points coming in the scene.

**Noise.** In digital images, the appearance of "salt-and-pepper" colored pixels in parts of the image. Typically caused by the use of higher ISO settings. This is similar to the grain that appeared in film prints when using high ISO films.

**Program Mode.** The camera automatically adjusts both the shutter speed and aperture to produce a properly exposed photograph. *See* automatic mode, aperture priority or shutter priority.

**RAW.** A file format used to save digital images. RAW files are very large and contain all of the information recorded by the camera without any compression.

**Rule Of Thirds.** A guideline for composing images. According to this, an imaginary grid of two vertical and two horizontal lines (like a tic-tac-toe board) is superimposed over your image frame. Placing your subject at the intersection of any two of these lines tends to create an appealing composition.

**Shutter Priority.** An exposure mode in which you select your shutter speed and the camera automatically adjusts the aperture setting for a perfectly balanced exposure.

**Shutter Speed.** The amount of time the camera's shutter remains open during an exposure. This controls the amount of light that is recorded.

**Spot Metering.** A method used to measure the amount of light entering the camera based on a small area of the subject. This information is used to set the right aperture and shutter speeds for an exposure.

**Telephoto Lens.** A high-powered lens similar to the lenses used in binoculars. This attaches to your camera and allows you to take close-ups of distant objects.

**TIFF.** A file format used to save digital images. TIFF files contain uncompressed data for very high image quality. This also creates very large file sizes.

**Vibration Reduction.** *See* image stabilization.

**White Balance.** A feature of digital cameras that allows you to create accurate colors in a variety of different lighting conditions.

**Wide-Angle Lens.** A lens typically used to photograph landscapes. Usually very sharp, but not useful for butterfly photography.

**Zoom Lens.** A lens that offers variable focal lengths, giving you multiple options for composing your images.



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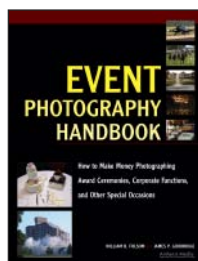
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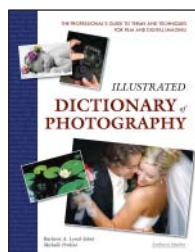
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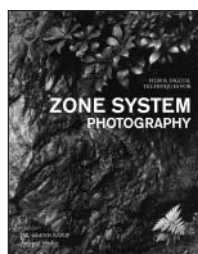
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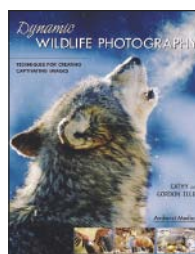
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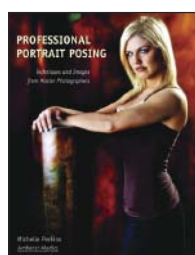
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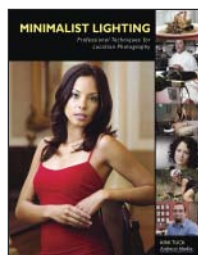
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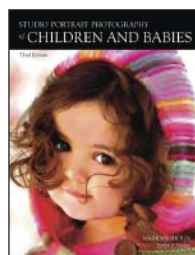
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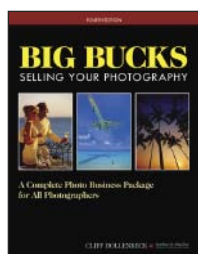
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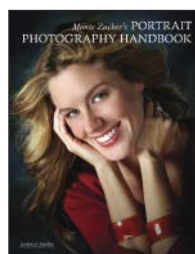
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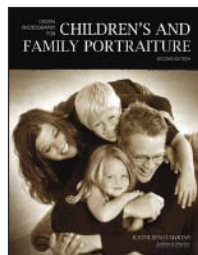
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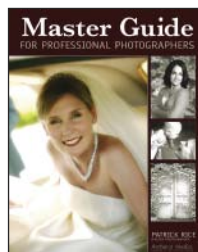
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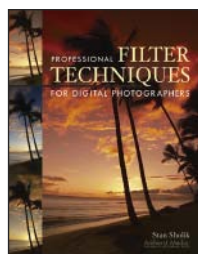
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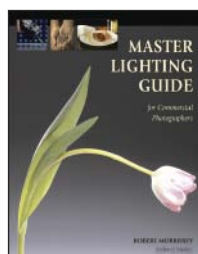
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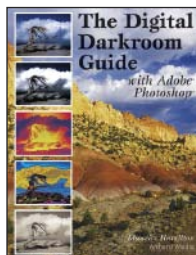
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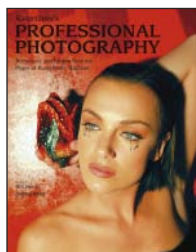
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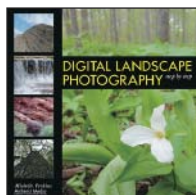
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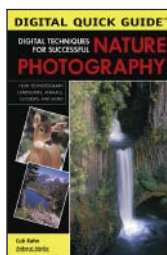
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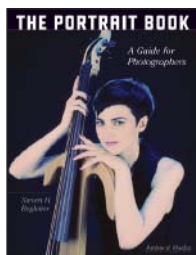
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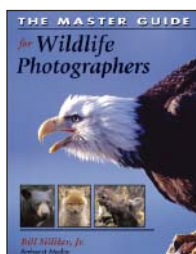
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